AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

UNIVERSITY MICROFILMS
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PIZ

JULY 1957

# Precision Metal Molding

# PMM

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS

"Permanent mold castings in aluminum made mass production possible for our company . . ."

John L. Eberly
chief engineer
Thompson Electric Co.

See Page 3

# Aluminum and Zamak

## In All Standard Or Special Aluminum And Zinc Based Die Casting Alloys

## ALUMINUM

**ALLOYS**

You're always sure of fast trouble-free production, less scrap and lower costs when you buy from your best source of supply.

- All ingot is quality controlled during production to insure uniform quality metal that is free from impurities and gas

## ZAMAK

**ZINC BASE DIE CASTING ALLOYS**

- Composition is constantly checked to assure ingot meets your specifications
- All shipments are palletized and shipped with a certificate of analysis
- Deliveries are promptly made to meet your production schedule

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**CERTIFIED ALLOYS CO.**

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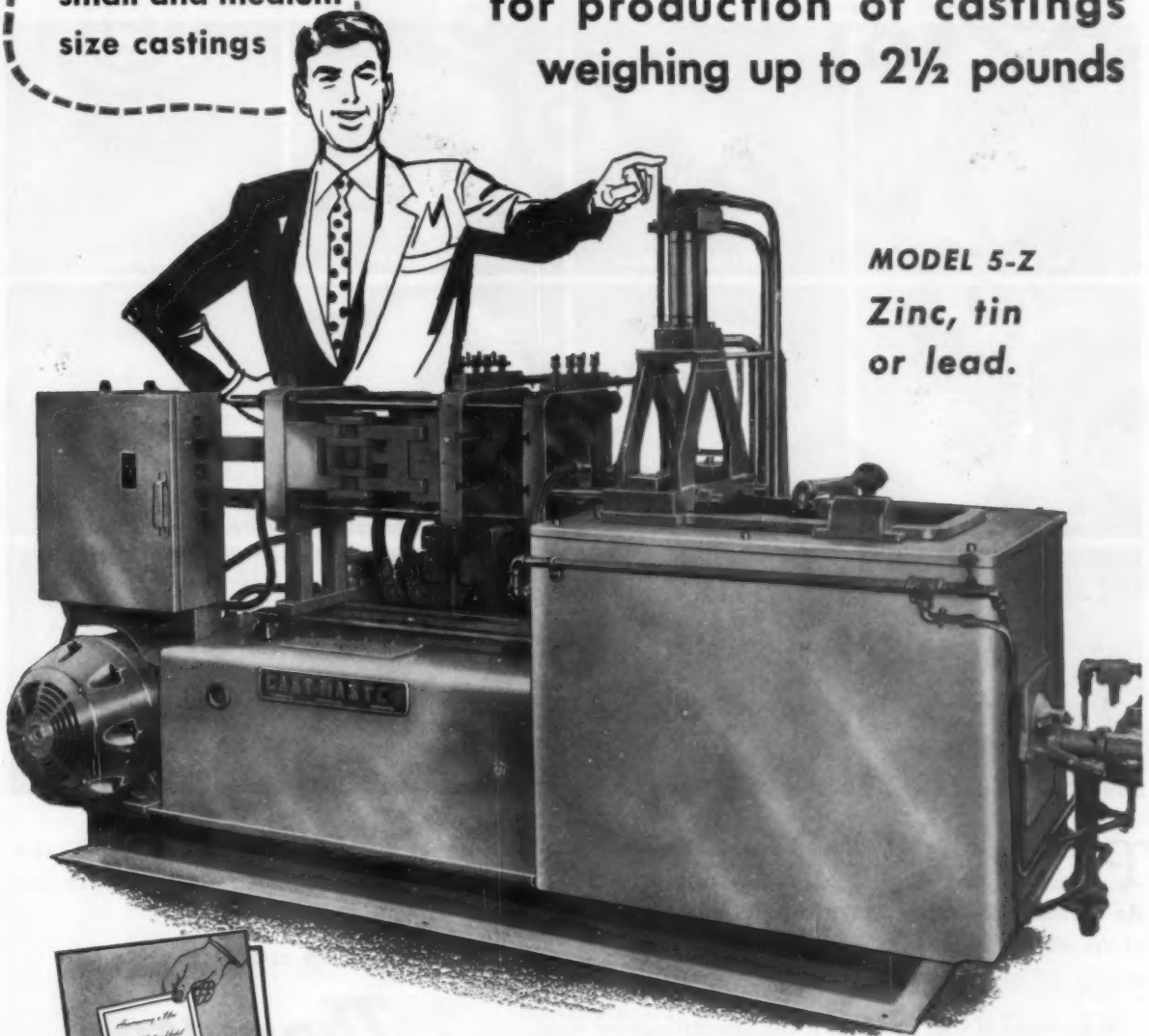
Here's a natural for shops doing small and medium size castings

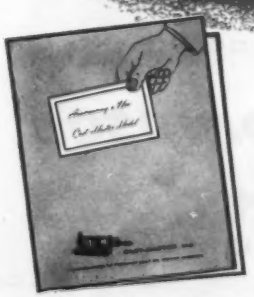
# *The* MIGHTY MIDGET

## for production of castings weighing up to 2½ pounds



***MODEL 5-Z***

***Zinc, tin or lead.***



SEND FOR ILLUSTRATED BROCHURE WITH COMPLETE SPECIFICATIONS

Yes, the new Cast-Master Model 5Z is a natural for any die casting shop which specializes in small and medium size work, or as a supplementary machine for handling small dies. The Model 5Z embodies many of the exclusive efficiency-producing features of the larger Cast-Master models, and is capable of producing mirror smooth, hardware finish castings at a high rate of speed. Write today for specifications and complete information.

***EASTERN REPRESENTATIVE:*** *Milton Harmon, 18 Rock Rd., Milford, Connecticut*

**CAST-MASTER** *Inc.* 23901 AURORA ROAD BEDFORD, OHIO

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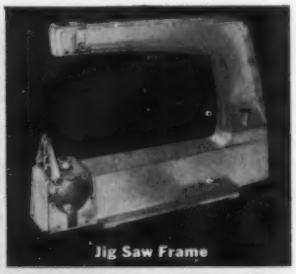
# HOW ARE THESE PARTS MADE?

## *What's your answer?* (*hint: Either a die casting, permanent mold casting or impact extrusion. Correct answers are shown below.*)

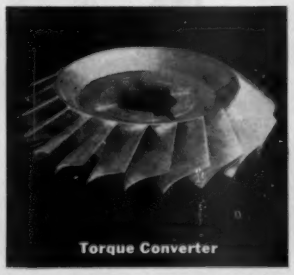
Gas Meter Housing

Aircraft Fuel Pump Body

Outboard Motor Piston


Jig Saw Frame

Hook and Spool Assembly


Torque Converter

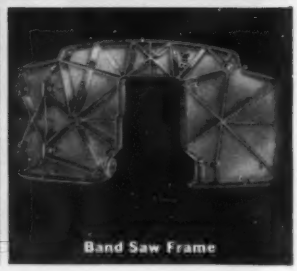
Aircraft Extrusion

105 mm. Mortar Fuse Body

Turban Shroud

Aircraft Fuel System Casting

Talkout Drum


Band Saw Frame

PRECISION engineered, hard-to-make parts are a specialty at Thompson's Light Metals foundry. As examples of Thompson's versatility, the parts above clearly demonstrate our ability to produce widely different products of exacting requirements.

Regardless of your product, if you use castings or impact extrusions, our creative engineers can help you simplify your production and cut costs. Let us quote on your plans. Write Department PMM-7, Light Metals Division, Thompson Products, Inc., 2269 Ashland Road, Cleveland 3, Ohio.

The correct answers to the above are: Die Cast—1, 4, 6, 12. Permanent Mold Cast—2, 5, 9, 10. Impact Extruded—3, 7, 8, 11.

**You can count on**

**Thompson Products**

**LIGHT METALS DIVISION**

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# IN THIS ISSUE

July 1957: Volume 15 Number 7

## COVER STORY

**PERMANENT MOLD CASTINGS** are responsible for the Thompson Electric Co., of Cleveland, Ohio, being able to organize and inaugurate a program of complete product modernization. In our cover photo, are seen Robert Farrington, at left, Thompson's president, discussing details of the changeover from sand castings to permanent mold castings with his chief engineer, John Eberly. They solved the problem of model consolidation by using permanent mold castings. See page 40.

## FEATURE ARTICLES


**35 WHO BUYS DIE CASTINGS?**
Another in this series, showing and describing the die castings used by the builders supply industry; the fourth largest consumer of die castings.

**40 HOW AN INEFFICIENT OPERATION WAS MODERNIZED**
By combining assemblies into single castings and by using permanent mold castings instead of green sand, a modern, high production operation replaced an older inefficient one.

**42 HOW TO SOLVE SMALL PARTS PRODUCTION DESIGN PROBLEMS**
The use of sinterings in the manufacture of cameras, projectors and allied equipment demonstrates how costs can be cut and quality raised at the same time.

**44 LOW COST PRECISION TOOLS**
In the production of fine tools that will give a life-time of service, this manufacturer turned to die castings instead of sand castings.

**45 SHELL MOLD CASTINGS FIT FITTINGS TO A "T"**
To withstand corrosion and erosion, cut machining costs and reduce rejects to the vanishing point, shell mold cast plumbing fittings in red brass are the best for this manufacturer's customers.

**47 CORROSION AND EROSION RESISTANT NOZZLES**
In the chemical and petroleum industries, spray nozzles are subject to severe corrosion and erosion. Investment casting in the most desirable alloy solved the problem.

**84 HOOK-LINE AND ROLLERS**
For foundries that handle large numbers of castings, conveyorization may be profitable. Here is the experience of one such company.


## FINISHING SECTION


**51 A GLOSSARY OF BARREL FINISHING TERMS**
Through the cooperation of almost the entire barrel finishing industry, a glossary of terms has been compiled that should be of help to both user and supplier of barrels and supplies.

**55 CHOOSE THE PROPER BELT AND WHEEL**
The correct abrasive belt running over a properly chosen contact wheel can lower finishing costs. Selection charts are given to help make the best selection.


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98 Opportunities


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# BETWEEN THE LINES

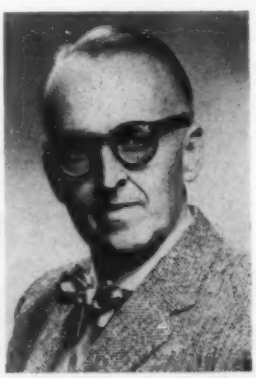
*the editor's viewpoint on articles in current and forthcoming issues*

**CAN YOUR PRODUCTION BE MODERNIZED?** There are many ways to bring out-of-date manufacturing practices into line with today's prices and methods. One way is to install new machinery and equipment; another is to redesign your product to take advantage of more economical methods. But first of all, you must *discover the outmoded practices in your shop* that need modernizing. Sometimes we get so accustomed to doing business in the same old way that we fail to look at them critically. With competition increasing today, it becomes essential to study our methods more closely. One company making lighting fixtures took a good look and found its practices *25 years behind the times.* What they did to overcome this makes a dramatic story, on page 40 of this issue.

**LIKE A DEEP SEA DIVER** discovering the wonders of nature beneath the ocean, we went around our home the other day looking for the dozens of small, unobtrusive die castings that go into builders' hardware. We had hardly appreciated how many die cast hardware items go into cabinet hardware, plumbing goods, casement hardware, venetian blind fittings, heating devices, storm window braces . . . and dozens of others . . . enough to make builders' hardware *one of the major uses for die castings.* We decided to show you some of these die cast builders' items. The photo story begins on page 35.

**BARREL FINISHING NOMENCLATURE** published in this issue of PMM is the result of a cooperative effort by members of the barrel finishing industry. A tentative list of terms, submitted to equipment and supply manufacturers, brought dozens of major revisions, additions and deletions. The result of this project, with alternative definitions given for controversial terms, appears on page 51.

**GO WEST, YOUNG MAN,** is a cry heard with increasing effect, today. The burgeoning industry on the West Coast boasts some of America's most modern plants and most progressive industries. To keep our readers abreast of important developments out there, PMM now has a West Coast editor, a veteran of many years technical writing. Scholer Bangs, now writing for PMM from California, uncovered a first-rate foundry modernization story, and in this issue we publish his report on the conveyorization of a major permanent mold and shell mold foundry. It starts on page 84.

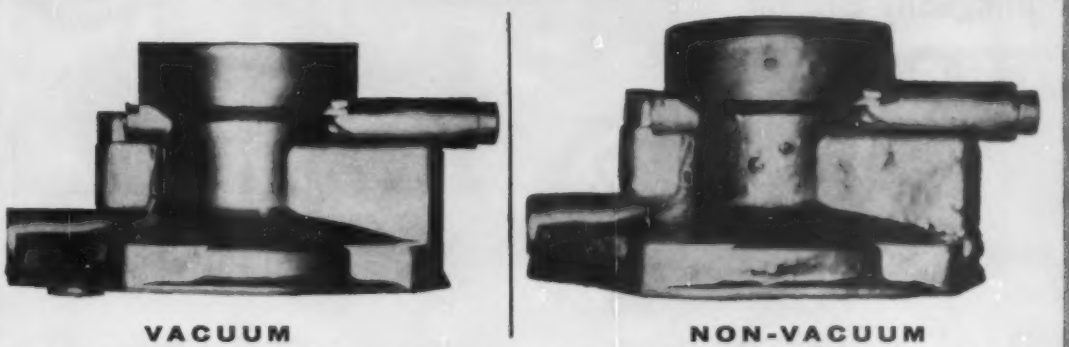


SCHOLER BANGS

**VACUUM TECHNIQUES APPLIED TO POWDER METALLURGY** will be the subject of a technical paper by Dr. Henry Hausner, a pioneer in powder metallurgy, to be published in an early issue. It marks the first time this important subject is covered exhaustively, and will be an important contribution to industry advancement. The paper, a condensation of a course to be given by Dr. Hausner at New York University, consists of original research results, plus the compilation of scattered references in industry literature.

## New Reed-Prentice Vacucast Process Gives

# DENSER, STRONGER ZINC CASTINGS!



VACUUM NON-VACUUM

These two production-run zinc die castings, brought up to 750°F. in 45 minutes, clearly show that the Vacucast process produces stronger, far less porous castings than standard, non-vacuum samples.

Here's a big, new improvement in zinc die casting – the Reed-Prentice Vacucast system. Offered as original equipment *only* on REED die casters, this new vacuum casting process gives you higher quality castings than were ever possible before, and at a lower cost.

Exhaustive testing, conducted on Vacucast zinc castings by an independent testing laboratory, show the superiority of this new process. Here are some of the advantages you get with this new vacuum die casting operation:

- Up to 20% faster cycling
- Rejects cut by 50%
- Surface quality improvement greatly reduces polishing and buffing
- Increased hardness and strength, less permeability
- Porosity practically eliminated
- As much as .02" greater skin thickness in thin castings
- Big metal savings through permissible reduction in wall thickness
- Can use existing dies without alteration

**ALUMINUM DIE CASTING TOO!**

Now under final development and test – a new aluminum self-feeding Vacucast machine process. Watch for an announcement by Reed-Prentice for this newest engineering advancement.

To get complete information on the new Vacucast process, write today to Reed-Prentice Corp., 677 Cambridge Street, Worcester 4, Mass.

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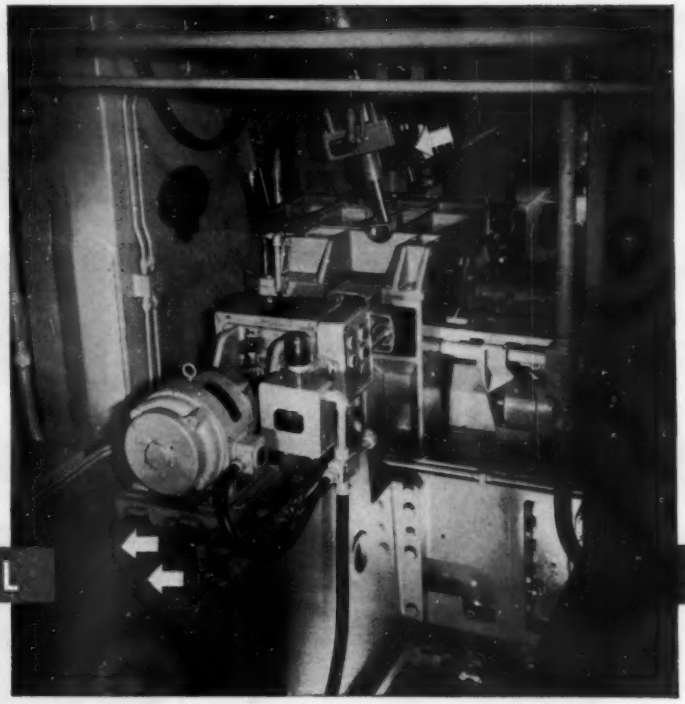
# 50

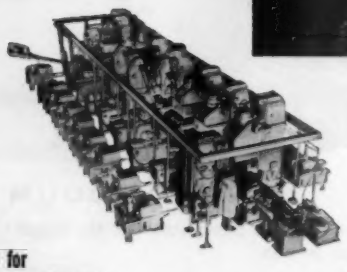
## Auto Blocks An Hour!

### WITH THE HELP OF

## Allegheny Ludlum

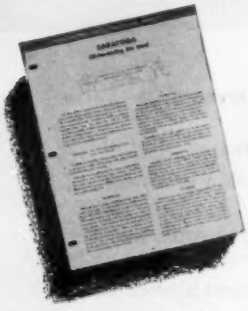
### SARATOGA TOOL STEEL





Allegheny Ludlum Saratoga was used for the steel ways (note arrows, above) of this giant unit, illustrated at left in a bird's-eye view reduced to miniature size.

**Write for BLUE SHEET ON SARATOGA**



This concise four-page folder gives all needed handling and shop treatment details on Saratoga. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

**ADDRESS DEPT. PM-91**

**98 SEPARATE OPERATIONS** are carried on by this versatile machine which turns out 50 V8 auto engine blocks an hour. It consists of 18 machining units, each of which is fitted with hardened and ground steel ways of A-L Saratoga to guarantee accuracy in production.

**MILLING, TREPANNING, DRILLING,** counterboring, reaming, chamfering, automatic inspection of holes for depth and removal of chips are the operations performed by this amazing mechanism.

**SARATOGA WAS USED BECAUSE** its extreme hardness, high resistance to wear, and excellent machinability more than met the customer's high requirements for maintaining accuracy in this huge, multi-station machine.

**ALLEGHENY LUDLUM METALLURGICAL SERVICE** can solve *your* tool or die steel problems. ● Call your local A-L representative or distributor, or write *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.*

**For nearest representative, consult Yellow Section of your telephone book.**

For complete **MODERN** Tooling, call

# Allegheny Ludlum

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AL® FINE TOOL STEELS SINCE 1854

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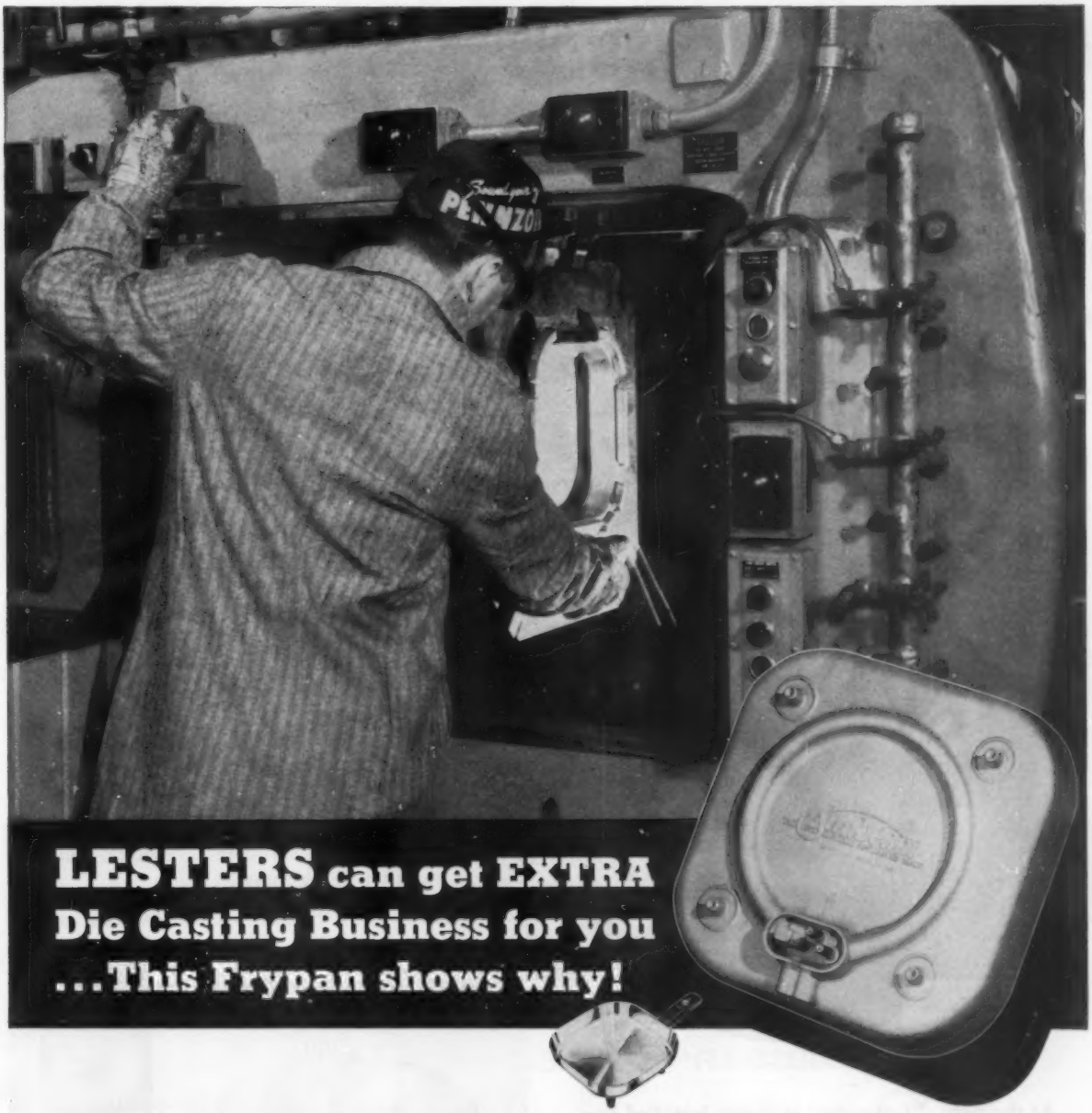


# LESTERS can get EXTRA Die Casting Business for you ...This Frypan shows why!

Specifications: 121 square inches, heating element insert, absolute non-porosity to resist frying temperatures, and flawless finish. And to top it off, it had to be cast with No. 360 prime alloy, to provide the finest non-corrosive utensil. As you know, it's one of the toughest alloys to cast.

Nevertheless, Meta-Mold Aluminum Company in Cedarburg, Wisconsin, working exclusively on Lester machines, has been supplying Sunbeam Corporation with such fine parts for their automatic Frypan, that they have extended the life of the die from a normal 30,000 shots to an amazing 100,000 shots. Besides, secondary finishing costs have been cut to the bone.

Sunbeam Corporation has been so very impressed and pleased that they have ordered Lesters for their own plants, to assist in the production of the product.

Here's the clincher. Meta-Mold has been die casting for less than two years and has been out-performing more experienced vendors who don't use Lester machines.

*Complete machine specifications available in Bulletin 101. WRITE TODAY.*

*LESTER-PHOENIX, INC.*

2708-N CHURCH AVENUE • CLEVELAND 13, OHIO

*Agents in principal cities throughout the world*

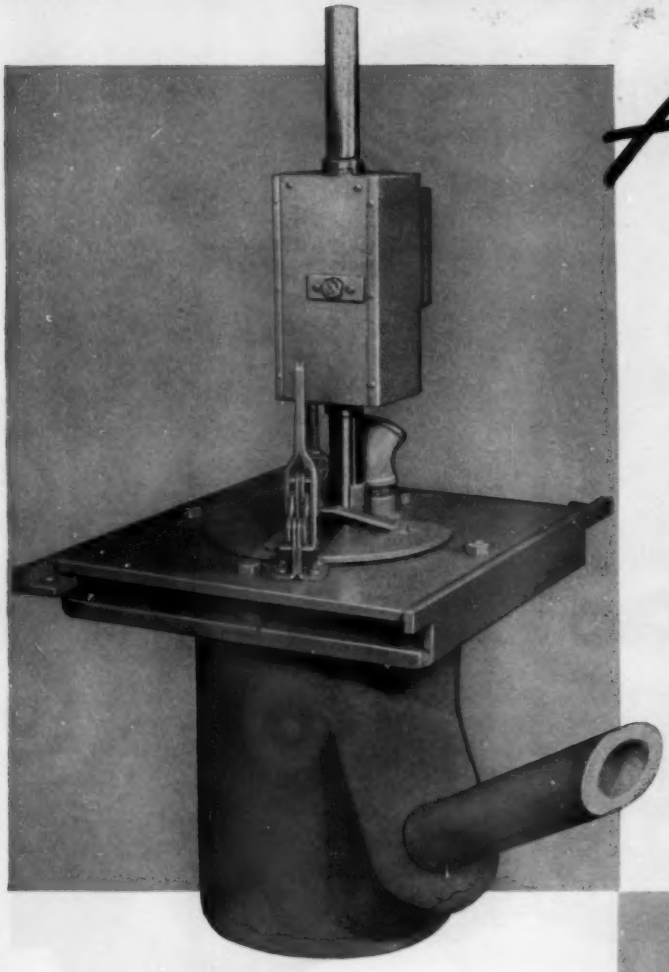
*For more information circle No. 43 on the Reader Service Card*

# Automatic casting of Aluminum *now practical*

## with *New* LINDBERG-FISHER

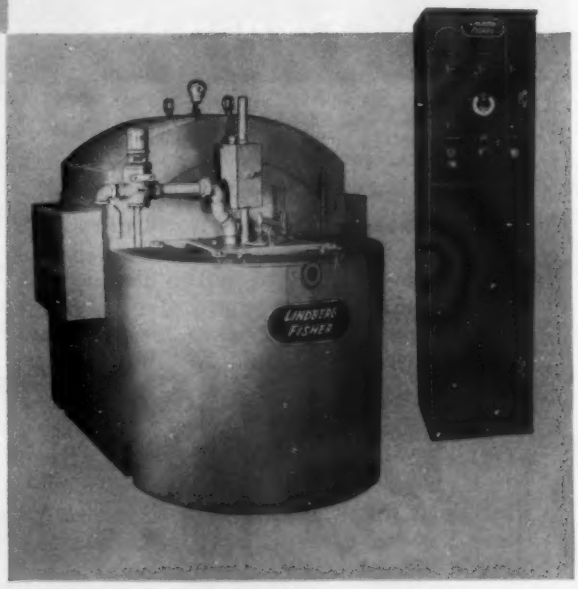
We call it "LITTLE JOE"

## *Autoladle*



To the best of our knowledge the Autoladle is the first practical automatic aluminum ladling unit yet devised. Thoroughly tested and proven in service, the Autoladle is adaptable to induction, electric resistance or fuel fired reverberatory furnaces. In any installation it offers these advantages:

- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.




At the right, "Little Joe" is shown installed in a Lindberg-Fisher electric resistance aluminum holding furnace. With it is the panel cubicle and controls which is supplied completely assembled and wired. For complete information on the Autoladle get in touch with your nearest Lindberg Field Representative (See your classified phone book) or write us direct.

LINDBERG FISHER

**A Division of Lindberg Engineering Company, 2463 West Hubbard Street, Chicago 12, Illinois**

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## Glidden formula for your profit:

## CHANGE METAL POWDER TO PRECISION PARTS

Proved way to cut costs on high-volume production of precision parts: Glidden Powder Metallurgy! That's why Glidden *Resistox*® Metal Powders are so widely used for bearings, friction materials, brushes and other parts.

Leading fabricators like The United States Graphite Company, Division of the Wickes Corporation, Saginaw, Michigan (producers of GRAMIX® sintered metal parts), look to Glidden as a primary source for metal powders.

*Resistox* Metal Powders meet all standards for purity and consistency. And a much greater resistance to oxidation gives *Resistox* 5 to 10 times the stability of ordinary metal powders!

Perhaps Glidden can help you find a cost-cutting solution to your metal parts production problems.

Write now for more detailed information.

**THE GLIDDEN COMPANY**

*Chemicals - Pigments - Metals Division*

**Baltimore, Maryland • Collinsville, Illinois • Hammond, Indiana • Scranton, Pa.**

CHEMICALS PIGMENTS METALS

QUALITY Glidden PRODUCTS

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# CASTING ABOUT

*technical news of applications*
*& processes involving precision metal moldings*

SLIDE RULE FOR ALLOYS

SPOOL FASTENERS

TV FOR DIE MAKING

**SLIDE CHARTS** are available nowadays to help designers make many of their important decisions. One of the newest of these engineering aids is an alloy slide chart, left, above, available free from Lebanon Steel Foundry. The handy, 4" x 9" slide chart covers carbon and low alloy steel castings on one side, and the stainless and corrosion resistant alloys on the other. Information included: nominal analysis; Lebanon, ACI, AISI, ASTM and other designations; nominal physical properties; and heat treatments. The editors of PMM will forward requests.

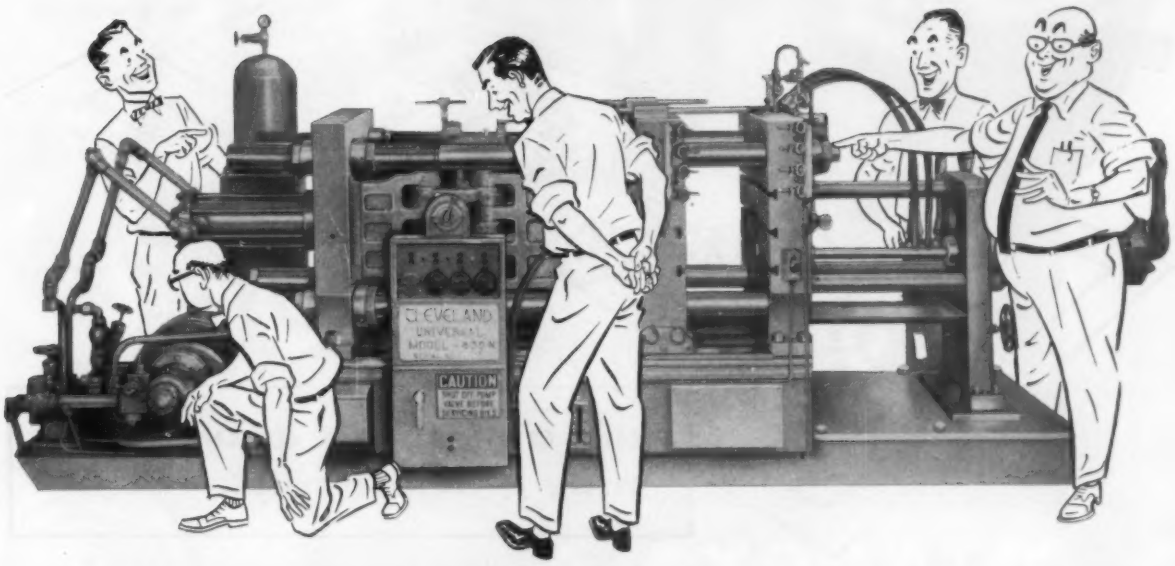
**ASSEMBLY OF WOODEN SPOOLS** that are used to hold wire has been greatly simplified by replacing the old-fashioned steel nut, bolt and cup washer fasteners with specially-designed zinc die cast pressure pads, center above. The new zinc pressure pads are made so that one part of the fastener is placed under the head of the bolt to replace the cup washer. Result: pressure is applied against the end grain of the wood causing the pad to hold tight regardless of changes in the wood itself. Unlike the older method of fastening, the die cast pressure pads cannot work loose. The die casting process permits formation of ribs to prevent turning, as well as a square recess in the head of the pad to keep the bolt from turning. The pad, of No. 3 alloy, is die cast in an eight-cavity die by Paragon Die Casting Company of Chicago for Howsam Spool Company of Aurora, Ill. According to the manufacturer, other uses for the new fastener are being explored.

**TELEVISION'S UNWAVERING EYE** today is helping Aluminum Company of America, produce huge, costly dies with a degree of accuracy never before possible. At Alcoa's Cleveland works, the broad screen of a 17-inch TV receiving set glows out from the control platform of a newly-developed die-layout machine. The set flashes pictures beamed by three cameras that are trained on finely calibrated scales. With this assist from TV, the operator can check to a thousandth of an inch, the machine's position as it locates dimension points on a hardened steel die block. First of its kind, the die-layout machine was developed by Alcoa and Consolidated Machine Tool Division of Farrel-Birmingham, Inc. TV cameras are installed to focus on three vernier scales. They constantly track the position of the machine's scriber as it inches across the surface of die blocks that can reach 10′ in width, 22′ in length and more than 3′ in thickness.

*Continued on page 15*

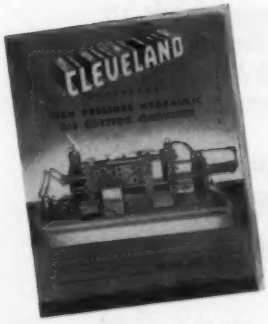
# WELL WORTH LOOKING INTO!

Cleveland Model 400-N shown with cold chamber end. Weight of metal per shot, including gate: 7.2 lbs., aluminum; 14.5 lbs., zinc.




# New CLEVELAND model 400-N

## Hydraulic Universal Die Casting Machine




*Write for new Bulletin*

From every angle, the new Cleveland Model 400-N has every feature you're looking for to give you better castings, faster, at less cost!

Here is a massively constructed, rugged, powerful machine. It locks dies at better than 400 tons pressure, *strain gauge tested*. Its faster die closing and opening speed will give you more shots per hour. Its rapid injection speed guarantees production of sound, dense, hardware-finish castings. Further, Cleveland's time-tested design and quality construction assure dependable, around-the-clock operation with machine maintenance at a minimum level.

Look into the new Cleveland Model 400-N, from every angle. You'll quickly discover why leading die casters call it the outstanding machine buy in its capacity range. Call in a Cleveland sales engineer for complete information and send for the new Model 400-N Bulletin.

***REMEMBER, CLEVELANDS CUT COSTS***

**THE CLEVELAND AUTOMATIC MACHINE COMPANY**

**4952 Beech Street**
**Cincinnati 12, Ohio**

SALES OFFICES : CHICAGO
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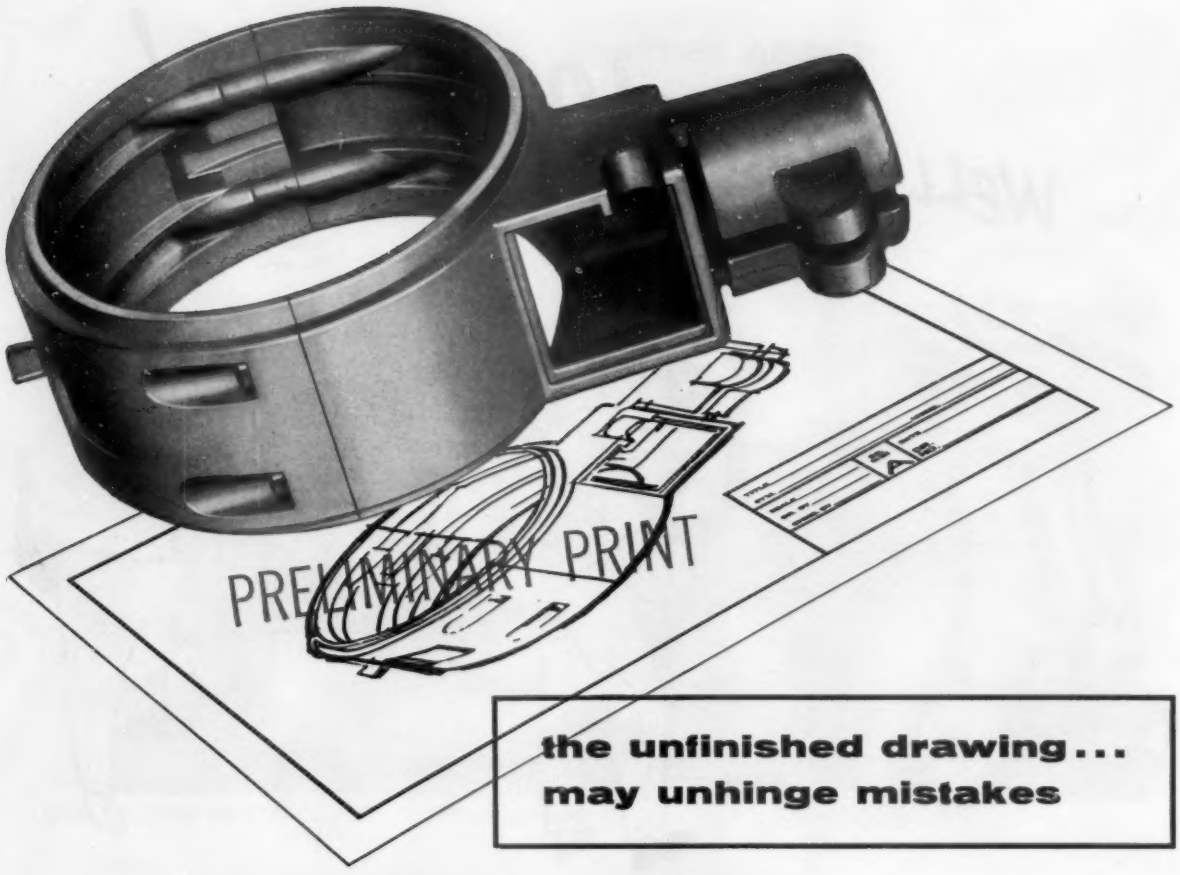


**the unfinished drawing...**
**may unhinge mistakes**

## with MADISON-KIPP zinc and aluminum die castings

The most successful product designers we know of, are those who send us their early sketches for review.

A die casting die represents the part drawing "turned inside out." Our practiced and practical die designers can do the turning mentally to expose any trouble spots in die making and die operation. Early design changes may promote substantial economies. They almost always advance time schedules.

It is standard procedure for our customers of long standing to send us their drawings as soon as there are enough lines to reveal the part design.

Please clip this ad as a reminder to contact us when you have die casting requirements.

kipp

**MADISON-KIPP CORPORATION**
213 WAUBESA STREET · MADISON 10, WIS., U.S.A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

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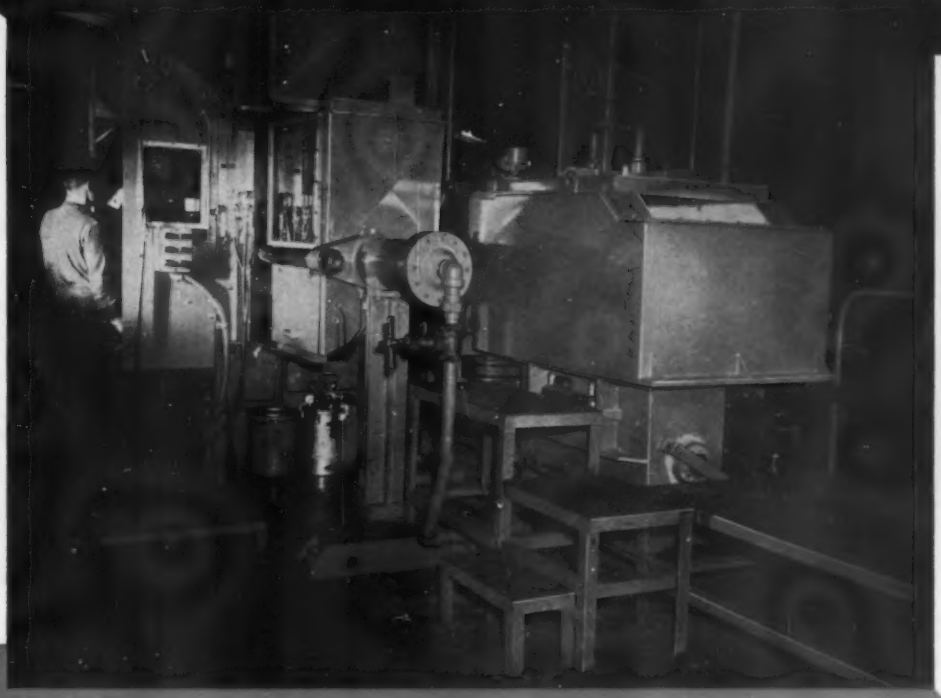
# ALUMINUM MELTING AND DIE CASTING INTEGRATED....



## with the duplex AJAXOMATIC®

With the touch of a button the operator releases the complete automatic cycle: die closing, *Ajaxomatic* pour, shot, cooling, die opening, ejection. Simultaneously, the Duplex *Ajaxomatic* melts batches of scrap and pig. Weight, time and temperature of each automatic pour are closely controlled.

**RESULTS.... Higher production rate**
**Uniform casting quality**
**No molten metal handling**
**No operator fatigue**
**PRODUCTION.... Up to 500 pounds per hour**
**CASTING SIZE.... ½ pound to 20 pounds**

**(Special units available for higher ratings)**

***MAY WE STUDY YOUR REQUIREMENTS?***

AJAX USA

60 CYCLE INDUCTION MELTING

## ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

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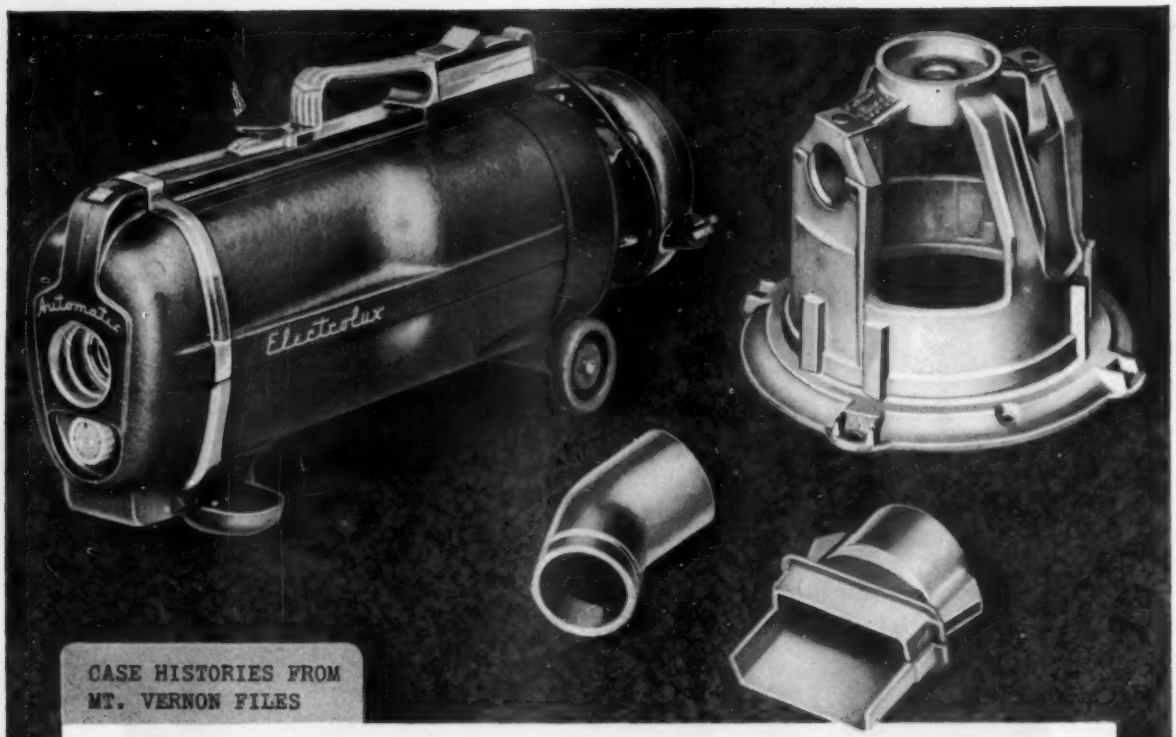


CASE HISTORIES FROM MT. VERNON FILES

# "Brain" stops new Electrolux automatically!

The minute this new Automatic Electrolux Cleaner has absorbed so much dirt it can no longer operate at high efficiency, it stops and the cover pops open. Replacing the sealed paper dust bag with a new one sets it up for further operation. It is one of several exclusive Electrolux features which includes 20% greater suction power than any machine the company has ever made. This is due in part to the increased speed and power of its electric motor.

The additional power and the automatic features of this new cleaner were not, however, achieved at the expense of added weight, because it is remarkably light for an appliance of such power and flexibility. By using die castings for the motor frame, elbow and adapter, both weight and manufacturing costs were kept down. As you can see these parts are complex. The motor frame alone, for example, involves apertures of various sizes and shapes, lugs, curved members, straight members, flanges, fillets, vanes and shoulders all combined into a very lightweight yet extremely rigid, strong unit. The other parts, although smaller, are also "toughies". But die casting is the most economical method of producing these intricate parts which combine strength with light weight and holding to such close tolerances that little or no machining is reqiured to finish them.

Mt. Vernon can help you make the most of these and other die casting advantages by a complete four-fold service of: (a) consultation—to help with design and production problems; (b) die making—on modern tool and die equipment handled by skilled personnel; (c) castings—aluminum and zinc, guaranteed "on grade" at all times; (d) machining facilities—for handling any machining operations your castings may require. As in the case of Electrolux, a switch to die castings may profit you tremendously. Let's talk it over.

**MT. VERNON**
**DIE CASTING CORP.**
STAMFORD, CONNECTICUT

**SALES REPRESENTATIVES**

Mr. Grant Elier
6 East 194th St., Cleveland, Ohio

Mr. Jerome J. Theobold
9 East Genesee St., Skaneateles, N. Y.

Mr. Anker Anderson
Cascade Road, Stamford, Connecticut

Mr. William Sauers
101 Briarcliff Road, Rochester, N. Y.

Mr. David H. King
75 Willow Street, Guilderland, N. Y.

Mr. George E. Hahl
39 South Munn Ave., East Orange, N. J.

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## CASTING ABOUT

*continued from page 10*

**PURCHASING AGENTS TOOK A LOOK** at the metals picture during the recent 42nd annual meeting of the National Association of Purchasing Agents. Materials consultant George Stuart Brady detailed a bright future for all non-ferrous metals in addressing the meeting. Among the highpoints: aluminum, nickel and tin will continue in great demand, while lead and zinc have some short term obstacles to overcome to stabilize their markets; sharply rising uses of aluminum and magnesium in die casting do not mean that zinc is being substituted out of the market; the use of slab zinc for die castings is almost double prewar levels and is increasing. Mr. Brady attacked government supports, such as the stockpiling of zinc, as tending to destroy incentive toward developing new processes and methods. Brass, he said, has already taken its worst decline, but both brass and copper must accept aluminum and plastics as competitors and find new relative positions for themselves.

**DIE CASTING IN ISRAEL** got a boost last month when the first cold chamber vacuum die casting machine outside the United States was shipped to Hatzor Kibbutz, whose Omen Metal Products Division is located on the border of the Gaza strip. The machine, a Reed-Prentice #1½, is the gift of J. Morgenstern of Halex Die Casting Company and D. Morgenstern of Nelmor Manufacturing Co., Cleveland, Ohio. Besides manufacturing "Presto" pressure cookers under license, the Israel firm also die casts irrigation couplings used on oil transmission lines, gate valves, stop cocks, electrical conduit boxes and military equipment. This new vacuum installation can be used for zinc, aluminum, magnesium or brass die casting.

**NUCLEAR USES FOR METAL POWDERS** were covered in a talk by Dr. Henry H. Hausner, vice president of Penn-Texas Corp., before the AIME Reactive Metals Conference in Los Angeles recently. Beryllium, zirconium and uranium powder metallurgy were discussed by the leading researcher. Beryllium, he told the group, is known as a non-ductile material, but when beryllium powder compacts are sintered in vacuum, they show some ductility and can be cold rolled 10% without forming edge cracks. Zirconium, Dr. Hausner commented, is one of the metals best suited for powder metallurgy because it sinters to complete density about 650 C below its melting point. It is necessary to start with zirconium hydride powders for this low-temperature sintering, with the hydride decomposing at about the same temperature as the start of sintering. The way to get perfectly dense sintered uranium, he said, requires hot pressing the uranium powder at 600 C at pressures of 10-15 tsi. This results in small grain size favorable for nuclear reactor purposes.

**OUT-OF-DATE METAL FORMING EQUIPMENT** is the basis for a survey in the Chicago area made recently by Commercial Discount Corporation, which reports that about 58% of such equipment is at least ten years old and another 20% is more than 20 years old. According to Sidney Feuchtwanger, president of the company, the three largest metalworking areas in the nation are Chicago with 610,000 employees, Detroit with 590,000 and New York-Northeastern New Jersey with 575,000.

**THE SECOND ANNUAL COURSE IN INVESTMENT CASTING** will be held September 8-13 at the Massachusetts Institute of Technology under the auspices of the Investment Casting Institute. So successful was the ICI's first study course last year at the University of Michigan, that a second session has been scheduled. Directing the week-long classroom and laboratory studies will be Dr. Nicholas J. Grant and Dr. Howard F. Taylor, professors at M.I.T. Subjects to be covered, according to Harry P. Dolan, executive director of the Institute, will include: gating, risering, solidification and heat transfer, metal and alloy systems, defects in castings, and consideration of new investment and allied processes.


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FLUXES

FOR ALL METAL MELTING INDUSTRIES

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Packaged for your convenience 5 & 10 pound, upon request.

CUSTOM-TAILORED FOR EVERY ALLOY!

ALUCO FLUXES.
Specially designed for casting aluminum alloys. Reduces oxidation, gives sound castings, removes non-metallic inclusions.

IMMUNITAS FLUXES.
Exothermic aluminum flux. Successfully reduces dross for aluminum sweating.

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ZINCOREX NSB and others.
Zinc fluxes. Practically smokeless. Separates metal from dross. Leaves no metallic inclusions in dross.

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(Photo courtesy of White Sewing Machine Corp.)

**Precision Metal Molding's . . .**

# DIE CASTING FORECAST ISSUE PUTS YOUR ADVERTISING MESSAGE AT THE SCENE OF ACTION!

In September PRECISION METAL MOLDING will present a special Die Casting Forecast Issue reporting on design trends, metals sales, technical developments, machinery and equipment trends, and current industry opinions.

This issue is of particular interest to both readers and advertisers. For readers it means a complete, authoritative source for up-to-date information telling where the die casting business is, and where it is going.

It also provides a golden opportunity for advertisers to tell their product and service story to 21,000 important engineering and purchasing people concerned with die castings.

If you are an advertiser seeking a bigger share of the die casting market, here's a made-to-order way to put your sales message at the scene of action . . . where people are most interested in die castings, at the time their interest will be greatest.

**FORMS CLOSE AUGUST 5TH . . . *reserve your advertising space NOW!***

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*Our 50th year producing high quality alloys*

## DIAMOND-J

# ALUMINUM ALLOYS

*Superior properties*

*Savings in casting costs*

*More castings per ingot pound*

*No premium in cost*

For over 50 years William F. Jobbins, one of the oldest and most widely known aluminum smelters in the United States, has been a leading producer of all grades of Primary and Secondary Aluminum Ingot.

Jobbins research department has developed such well known alloys as Almag 35 and 56, and Jobbins Supreme 3-6 and 4-8. The outstanding performance of these alloys in foundry usage is evidence of the experience, research and close manufacturing control which go into all Jobbins alloys for your assurance of top quality castings.

Specify Diamond-J quality aluminum alloys. 50 years of research and experience are your guarantee of top quality metal, manufactured under closest possible chemical and metallurgical control.

**WILLIAM F. JOBBINS INCORPORATED**

**P. O. BOX 230**

**AURORA, ILLINOIS**

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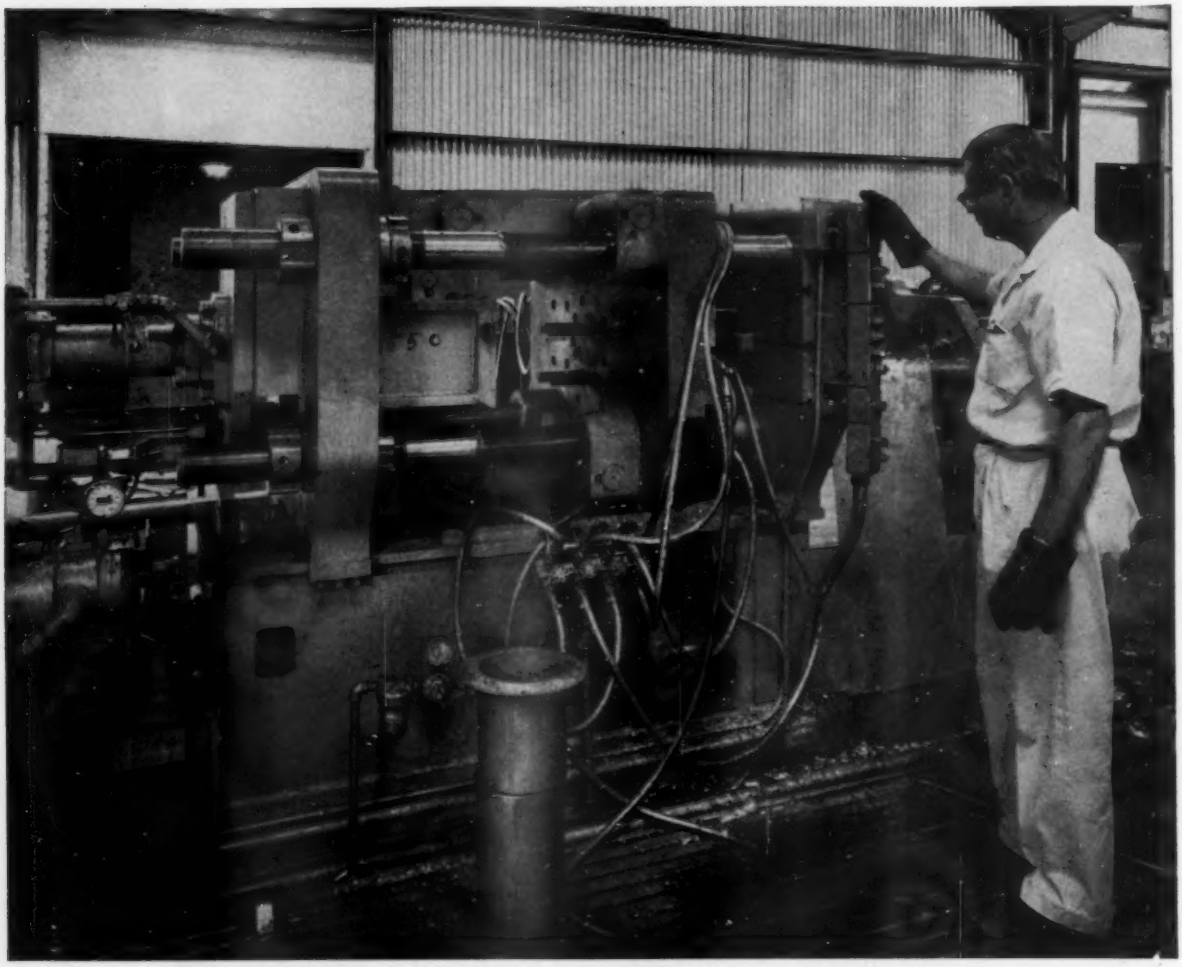

*Typical die casting machine, using dies of Cr-Mo-V (High V) at Production Die Casting Company, Houston, Texas.*

# For Economical Die Casting Use Cr·Mo·V (High V)

Any type of die casting, whether lead, aluminum or magnesium, can be performed economically with Cr-Mo-V (High V)—Bethlehem's 5 pct chrome-moly tool steel, with 1 pct vanadium.

Cr-Mo-V (High V) provides economical service in die casting because of its resistance to wash and erosion, and because it has the toughness to stay on the job for long periods prior to the development of a fine network pattern of heat-checking.

Besides, Cr-Mo-V (High V) is a uniformly annealed steel which permits ease of machining. It has center density and grain refinement, and is also free from porosity. With this grade of tool steel, cleavage cracking is unlikely, provided adequate radii are used in the die, and the steel is properly heat-treated.

Speaking of heat-treatment, you've never seen the like of Cr-Mo-V (High V), for it's a uniformly deep-hardening steel, with minimum size change and warpage. Even in massive sections it can be heat-treated to a uniform hardness as high as Rockwell C 45-47. Moreover, it's made by a controlled melting procedure, and its quality is checked by means of ultrasonic testing.

Your Bethlehem tool-steel distributor will be glad to furnish additional information about Cr-Mo-V (High V). Or better still, why not give it a trial run at your first opportunity. That's the best way to learn how good it really is.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

**FACTS ABOUT CR-MO-V (HIGH V)**

1. Made by controlled melting procedure, plus adequate forging reduction.
2. Ultrasonic tested for quality.
3. An easy grade to machine; Brinell 217 max.
4. Responds uniformly to heat-treatment.
5. Can be heat-treated in massive sections to uniform hardness as high as Rockwell C 45-47.

**BETHLEHEM TOOL STEELS**

BETHLEHEM STEEL

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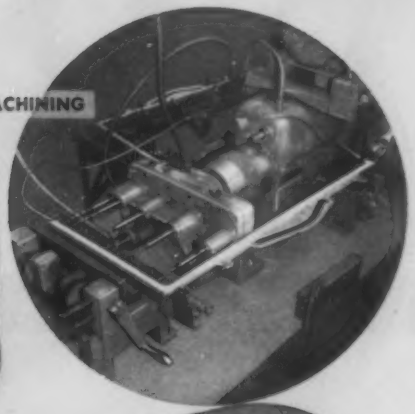
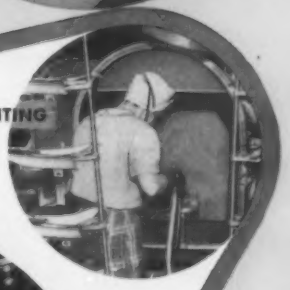
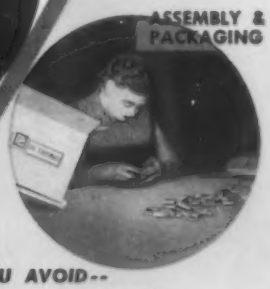
# DIE CASTING NEWS






# INTEGRATED FACILITIES

*One Supplier---*
*No Division of Responsibility!*

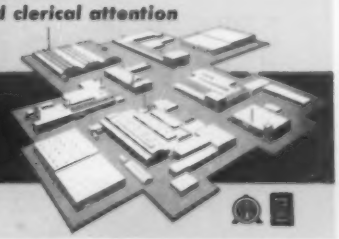



***Wise Managements Save:***

- ✓ **TIME**
- ✓ **MONEY**
- ✓ **MACHINES**
- ✓ **MATERIALS**
- ✓ **MANPOWER**

***--BY TAKING ADVANTAGE OF PRECISION'S INTEGRATED FACILITIES, YOU AVOID--***

- ***Shipping between suppliers***
- ***Rehandling of parts in your plant***
- ***Multiple inspections***
- ***"Passing the buck" on quality***
- ***Overburdening your own machine shops***
- ***Extended lead time***
- ***Paperwork and clerical attention***



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DIVISION OF HARSCO CORPORATION

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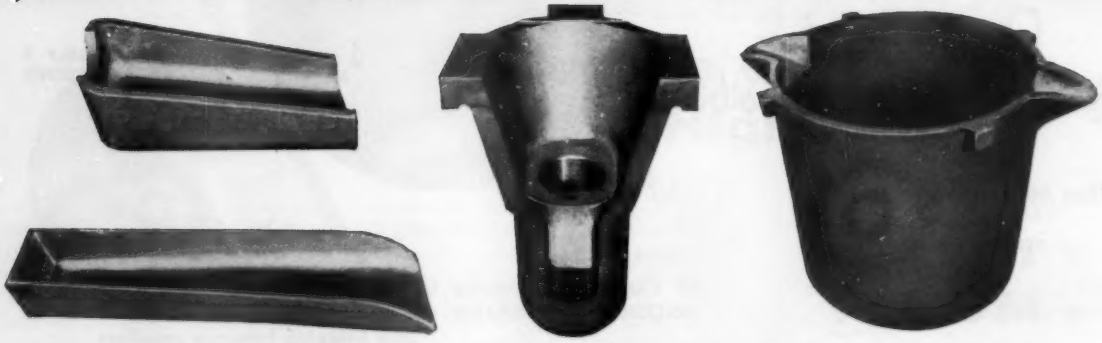
# NOW...A FULL LINE

# OF DODGE CUSTOM-MADE

# STEEL PARTS AND ACCESSORIES



Here's another industry first! Dodge now offers an *individualized* service for the manufacture of a wide variety of die-casting parts and accessories, each *custom-made* of long-lasting steel. If your needs include goosenecks, interliner and melting pots, pouring spouts, plunger pullers, chutes, pistons, tapered nozzles, skimming pots, etc., we'd be happy to quote on your requirements.

**DODGE STEEL COMPANY**

***Finished Products Division***

6501 Tacony Street • Philadelphia 35, Pa.

THE MOST IMPORTANT ALLOY IN A STEEL CASTING IS QUALITY

*For more information circle No. 25 on the Reader Service Card*

# OILITE POWDER METAL COMPONENT DOES "TRIPLE DUTY" IN POWER MOWER

*Another cost-saving application of* **Amplex Powder Metallurgy**

How to make a self-propelled rotary mower more compact and still permit the rotary blade to operate while the mower idled—*without increasing costs!* That was the problem company engineers tackled. One way was to combine three components—over-running clutch, oil pump piston cam, differential—into one. They experimented widely with designs and materials. Result: an OILITE powdered bronze worm gear with one side of the hub a cam operating the oil pump, the other side a wheel drive ratchet. (The other half of the ratchet—fixed to the drive shaft— OILITE powdered iron.) The design achieved the desired compactness and idling characteristics. OILITE powder metallurgy achieved a *major reduction* in cost, an *increase* in serviceability.

Do you have a design problem? Maybe Amplex has the answer. Write for detailed information about Amplex powder metal components—OILITE Bearings, Parts, Filters. Or call your nearest engineering representative listed in the yellow pages under "Bearings—OILITE."

OILITE PRODUCT

*OILITE is a registered trademark

*Only Chrysler Makes Oilite**

## AMPLEX DIVISION

**CHRYSLER CORPORATION • DETROIT 31, MICHIGAN**

***Representatives and dealers located throughout the world***

**BEARINGS • FINISHED MACHINED PARTS • PERMANENT METAL FILTERS • FRICTION UNITS • FERROUS AND NON-FERROUS METALS**

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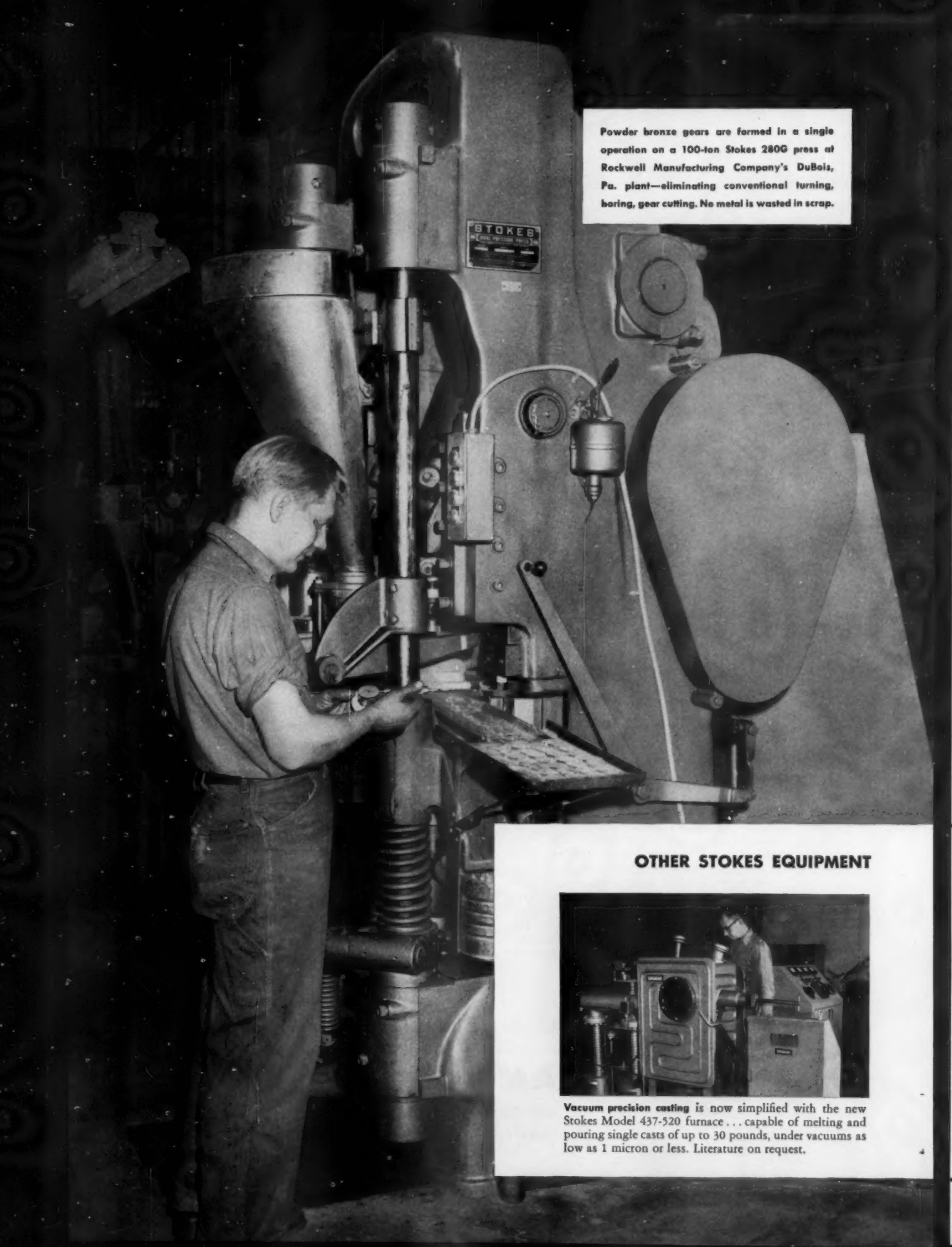



Powder bronze gears are formed in a single operation on a 100-ton Stokes 280G press at Rockwell Manufacturing Company's DuBois, Pa. plant—eliminating conventional turning, boring, gear cutting. No metal is wasted in scrap.

## OTHER STOKES EQUIPMENT



**Vacuum precision casting** is now simplified with the new Stokes Model 437-520 furnace . . . capable of melting and pouring single casts of up to 30 pounds, under vacuums as low as 1 micron or less. Literature on request.

# Rockwell makes better parts at less cost on Stokes Powder Metal Presses

**Powder metal processing, using a battery of Stokes presses, enables Rockwell Manufacturing Co. to produce close tolerance parts... obtain special qualities such as self-lubrication... all at reduced costs.**

Want to cut costs without cutting corners? Take a tip from the experience of Rockwell Manufacturing Company. At their DuBois Division, the powder metal department uses Stokes presses to make a variety of close-tolerance parts at economical cost, for use in gas and water meters, Nordstrom valves and other products of the company's manufacturing divisions.

This modern way to form metal is bringing Rockwell several specific advantages:

**Better quality.** The structure of powder metal parts is ideal for self-lubricating components. Precise tolerances are easily maintained, without resorting to costly machining practices.

**Lower costs.** The automatic Stokes presses require a minimum of labor. Production rate per man-hour is high. Waste of metal, compared to conventional cutting methods, is practically reduced to zero. Machine maintenance is negligible.

**Flexible production.** Because of the set-up versatility and operating speed of the Stokes presses, either short or long production runs can be made economically.

Pioneer in powder metal pressing, Stokes has embodied outstanding features of convenience, safety and flexibility in a complete line of presses. Latest in this line is the 50-ton Model 640 multiple motion press. It is easy to set up, with independent press adjustments and direct-reading calibration for the production of multi-level parts.

Investigate the proved potential of powder metal pressing... not only for ways to cut costs and save metal over conventional machining, but also for ways to get properties of metals, alloys, and metal and non-metal mixtures not obtainable by other techniques. Ask for a production and economic analysis on your specific parts. Our complete facilities, including sample production, punch and die design and fabrication, and operator instruction are at your service.

*Powder Metal Press Division*
F. J. STOKES CORPORATION
5500 Tabor Road, Philadelphia 20, Pa.

**FOR METAL-WORKING PLANTS**

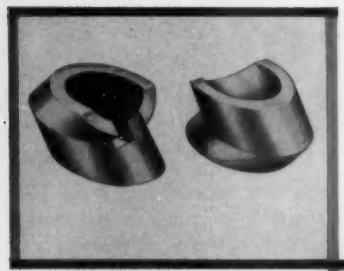
**Vacuum plating,** In Stokes Vacuum Metallizers, produces a bright, attractive, metallic finish at far lower cost than electroplating. A complete line of self-contained, centrally controlled systems is available. Write for literature.

**STOKES**

*For more information circle No. 65 on the Reader Service Card*

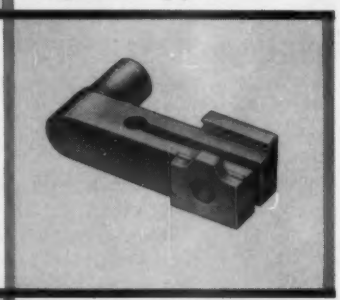
# Basic Considerations in Selecting alloys . . . . . for your INVESTMENT CASTINGS

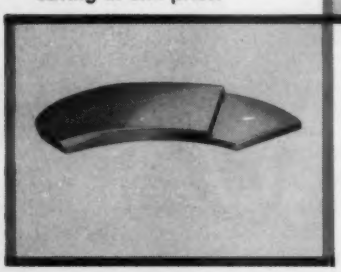
DO YOU KNOW THAT . . . an investment casting produced from a low cost metal may be MORE EXPENSIVE than one cast from higher priced material that may also have characteristics better suited to your requirements.



These angle connectors were originally investment cast in mild steel, a low cost material. To overcome corrosion problems, 303 stainless was substituted and because of its better castibility there was no increase in cost. Now, silicon brass is being used at a 10% saving on the original selling price.

This gage mount is an excellent example of unusually good casting characteristics of one metal offsetting a decidedly higher material cost. Originally priced in SAE 8620 steel, it was changed to beryllium copper at a 15% saving in unit price.





This simple textile machine part requires a high degree of wear resistance. Casting in the right metal provided better properties at lower cost than when machined from tool steel.

Get more complete information for this is only a small part of the story telling how the right metal selection for investment castings can often increase efficiency and reduce costs.

WRITE today for Bulletin 116-205 . . . it's FREE!

**HITCHINER**
*Manufacturing Company*
MILFORD 7, NEW HAMPSHIRE
REPRESENTATIVES IN PRINCIPAL CITIES

*For more information circle No. 37 on the Reader Service Card*


## PMM LETTERS

*the readers' forum*

### FIRE RESISTANT FLUIDS

Our company is in the process of designing and constructing a copper smelter for the Kennecott Copper Corp. in Hayden, Arizona and as a result we anticipate writing specifications on fire resistant fluids.

It would be most helpful if you could forward to us two copies each of the following articles.

1. Aqueous Base, Fire Resistant Fluids — Carbide & Carbon Chemical Co. By W. H. Millett.
2. Phosphate Ester Based Fire Resistant Hydraulic Fluids, by F. H. Langefeld, Monsanto Chemical Company.
3. Steps to Take When Installing Fire-Safe Hydraulic Fluids, by Charles R. Schmitt, E. F. Houghton & Co.
4. Also the article dealing with the experience of a large die casting company.

Your prompt and immediate attention to the above would be most appreciated by our company. L.H., project purchasing agent.

*This letter, just one of many of its type, serves to emphasize the trend to fire resistant hydraulic fluids in the precision metal molding fields wherever hot metal must be handled. ed.*

### OUR ERROR

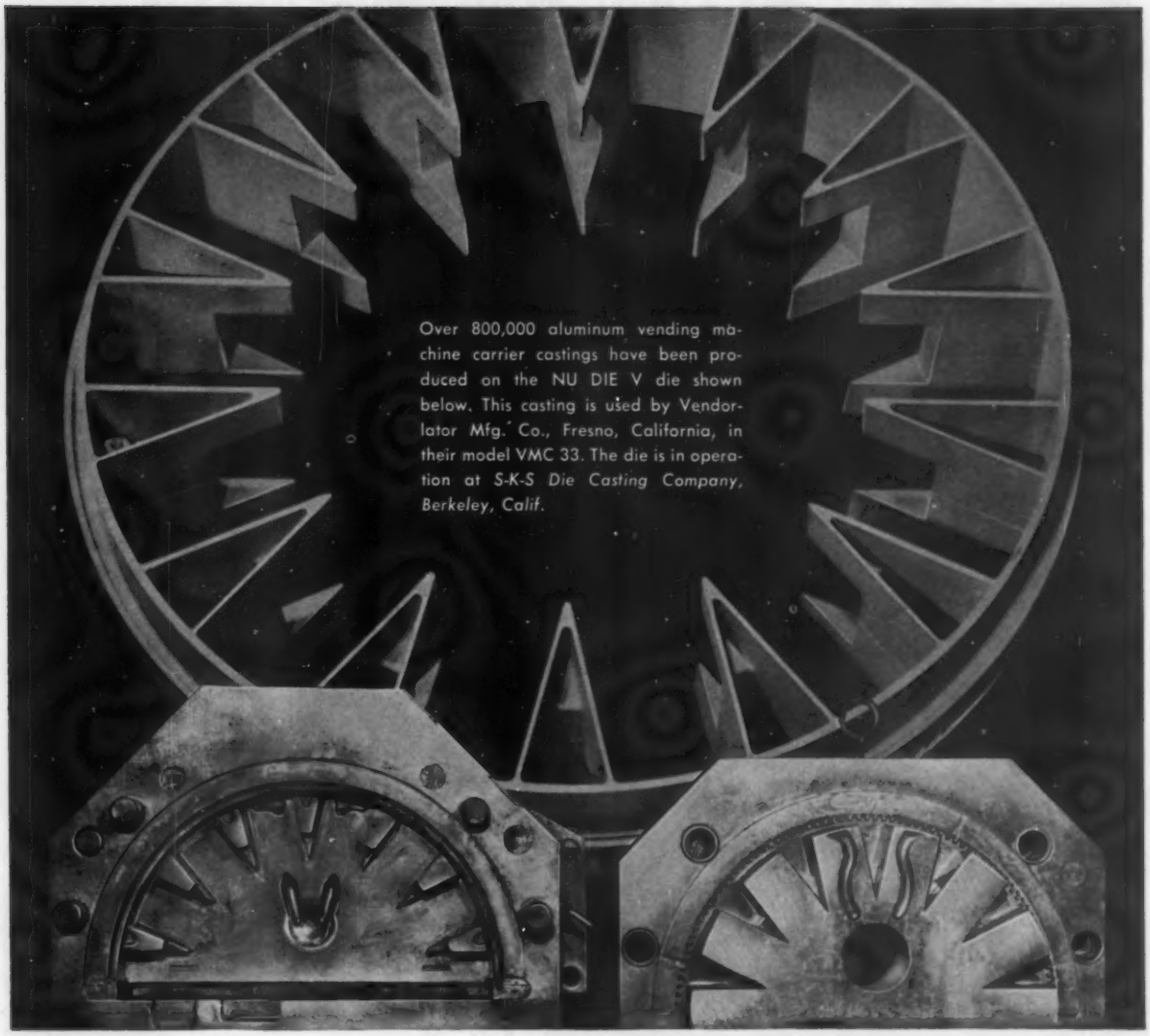
You are to be congratulated on your May issue of PMM and the "Idea File" it contains. That issue in particular will be referred to often for the valuable information it contains.

However, for this very reason we would like to point out two errors which would certainly give our customers a false idea of our abilities.

Under "What is the Lead Time" you write that "on repeat orders, lead time may be as little as one or two days, depending on foundry load." We wish this were possible, but actually two weeks would be very good timing, even for repeat orders.

Under "What is Accuracy?" there is a more serious discrepancy. You write; "As in the case of die casting, selected dimensions within a solid mold segment can be held to as little as 0.001 if required."

*Continued on page 30*



Over 800,000 aluminum vending machine carrier castings have been produced on the NU DIE V die shown below. This casting is used by Vendorlator Mfg. Co., Fresno, California, in their model VMC 33. The die is in operation at *S-K-S Die Casting Company, Berkeley, Calif.*

# Die of Crucible NU DIE V still in service after 800,000 "shots"

The die shown above, made of Crucible NU DIE V die casting die steel, has been in operation 10,000 hours. It has produced over 800,000 "shots" with no special maintenance required. And the die is still in excellent condition.

Long, continued runs like this develop high die heat of 700/900 F but the NU DIE V die has shown a minimum of heat checking, and is still giving dependable service. One good reason is that Crucible NU DIE V is made to die casting steel quality. And each piece is ultrasonically inspected.

Crucible NU DIE V, as well as $CSM_2$ for zinc die casting and holder blocks for aluminum, are available from local warehouse stocks — in 438 sizes — 1" to 40" wide, ¾" to 15" thick. When you want quality die steels fast, call Crucible. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

**CRUCIBLE** first name in special purpose steels

## Crucible Steel Company of America

*Canadian Distributor—Railway & Power Engineering Corp., Ltd.*

*For more information circle No. 23 on hte Reader Service Card*

# CRUCIBLE melting

**Die Casting Aluminum with Cold Chamber Machines and Crucible Furnaces**

For "cold chamber" die casting, melting or holding the metal in crucibles is preferred because of lower cost, better regulation and "crucible" quality metal.

Crucibles give minimum refractory maintenance even when chlorine is used for degassing. Iron contamination is completely eliminated.

Automatic temperature control is readily maintained.

Crucible furnaces can be heated with gas or oil fuel or electricity.

Crucible furnaces may be shut down over night or during non-working periods without any fuel or energy consumption or supervision.

*Photo courtesy Republic Die Casting Co., St. Louis 7, Mo.*



Have you seen the new "'CRUCIBLE CHARLIE' says . ." leaflets issued by Crucible Manufacturers Association? If not, ask your superintendent about this. He has a copy.

**CRUCIBLE MANUFACTURERS ASSOCIATION**

20 W. 43rd STREET, NEW YORK 36, NEW YORK

CRUCIBLES FOR FLEXIBILITY

**THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING**

VESUVIUS CRUCIBLE CO.
AMERICAN REFRACTORIES & CRUCIBLE CORP.
ELECTRO REFRACTORIES & ABRASIVES CORP.
JOSEPH DIXON CRUCIBLE CO.
ROSS-TACONY CRUCIBLE CO.
LAVA CRUCIBLE-REFRACTORIES CO.

*For more information circle No. 21 on the Reader Service Card*

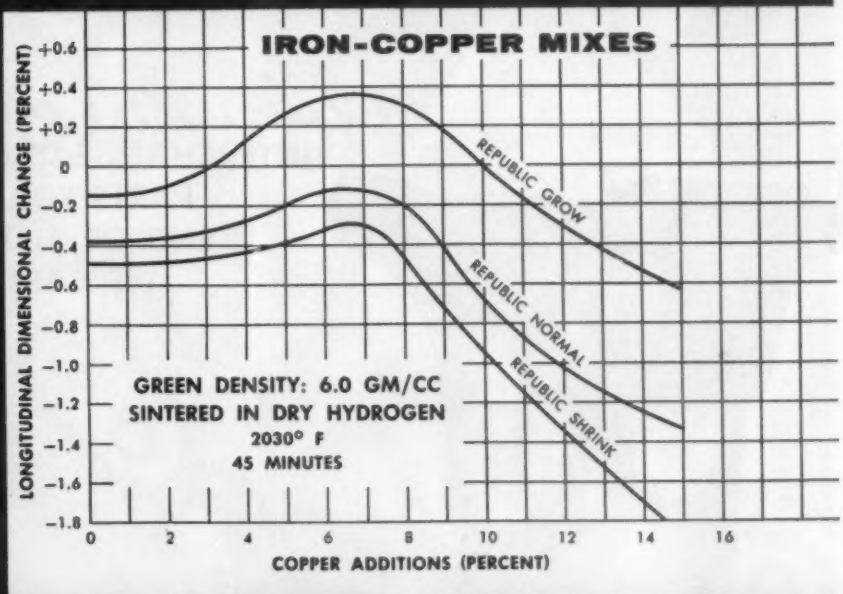
# NEW REPUBLIC IRON POWDERS WITH cdf

## Aid in Establishing Finish Dimension of Parts

TYPE "G"
(GROW)

TYPE "N"
(NORMAL)

TYPE "S"
(SHRINK)




The above chart shows the distinct dimensional change-characteristic that occurs when any one of Republic's three new Iron Powders—Type "G" for growth, Type "N" for normal, Type "S" for shrinkage—is blended with varying amounts of copper.

This change-characteristic is called *Controlled Dimensional Factor*—an exclusive Republic development.

The dimensional changes that occur, upon sintering, are shown for tensile bars pressed to a green density of 6.00 gm/cc. The bars were sintered in a dry hydrogen atmosphere at 2030°F. for 45 minutes. All values in this chart represent the average of numerous tests conducted by Republic's Metal Powder Division in the development of these new types of Iron Powder. In all cases, one percent zinc stearate was used as lubricant.

Our metallurgists and engineers will work with you in utilizing all the advantages of Republic Iron Powder with CDF. There's no obligation. Just mail the coupon to obtain their services, or for more information on test evaluations, chemical composition and physical properties.

**REPUBLIC**

**STEEL**

*World's Widest Range of Standard Steels and Steel Products*

REPUBLIC STEEL

REPUBLIC STEEL CORPORATION
Dept. C-3552-R
3192 East 45th Street
Cleveland 27, Ohio

☐ Send more information on Iron Powder with CDF.
☐ Have an engineer call.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

*For more information circle No. 61 on the Reader Service Card*

*Serving the Die Casting Industry*

# SINCE 1944

*with . . .* A COMPLETE LINE OF INTERCHANGEABLE REPLACEMENT PARTS FOR THE INJECTION END OF ALUMINUM & ZINC DIE CASTING MACHINES.

**GOOSENECKS— Large and Small**

**REX-BUCKEYE Gooseneck for LAKE ERIE 600/800. Weight—1200 #**

**REX-BUCKEYE Gooseneck for Special Air Injection Machine. Weight—85 #**

**THESE REX-BUCKEYE ENGINEERED PRODUCTS . .**

PLUNGER RODS | PERFECTION-SCHWANK DIE PRE-HEATERS | PERFECTION-SCHWANK DIE EDGE HEATERS | MACHINE POTS | BREAKDOWN POTS

PISTON RINGS | NOSE INSERTS | NOZZLES | SHOT SLEEVES | PLUNGER TIPS

GOOSENECKS | GOOSENECK SLEEVES (Nitralloy) | GOOSENECK SLEEVES (Tool Steel) | GOOSENECK SLEEVES (Alloy Iron) | PLUNGERS

**. . FOR ALL DIE-CASTING MACHINES**

ABC | A-C | B & T | CASTMASTER

CLEVELAND | D C M | HYDRAULIC PRESS | K U X

LAKE ERIE | LESTER-PHOENIX | REED PRENTICE | SCHULTZ

R·B *Rex-Buckeye*

*For more information circle No. 63 on the Reader Service Card*

# A Touch here does so much

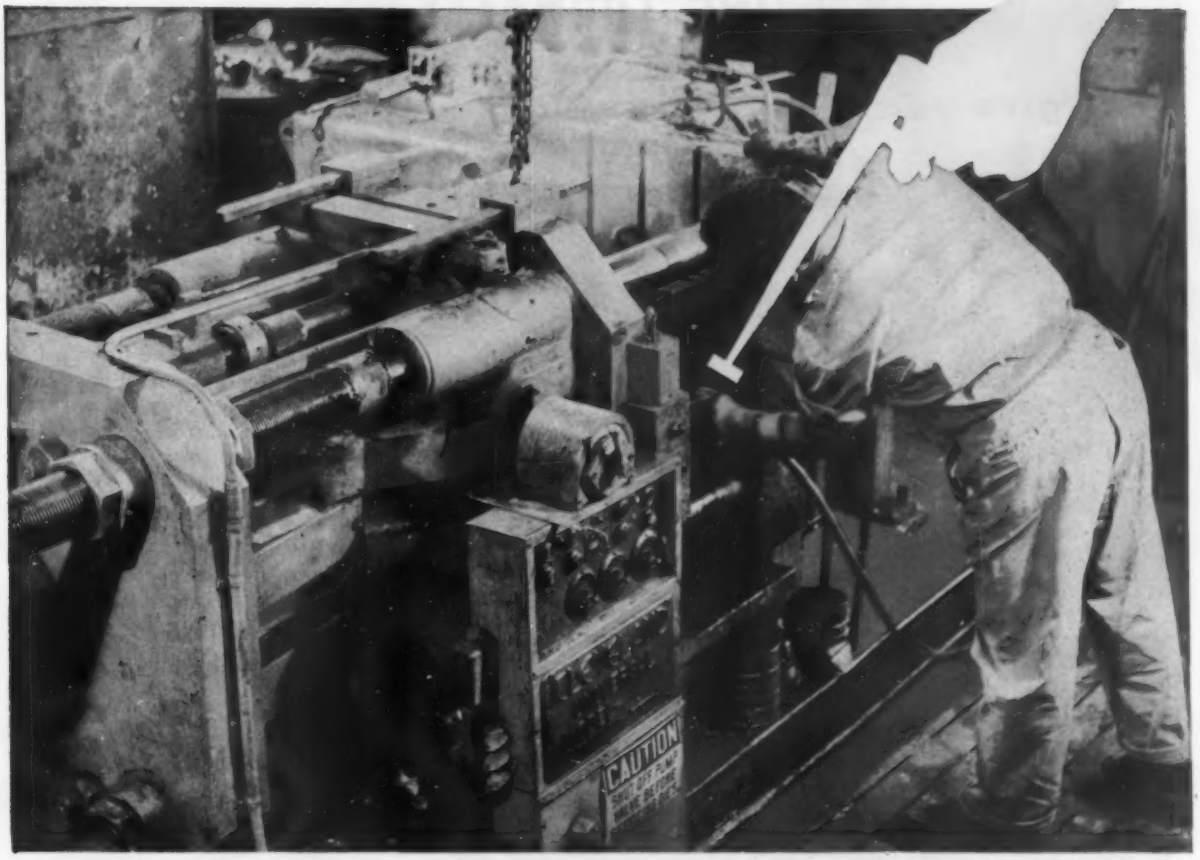



*Photo courtesy Bendix Foundries*

## HEAT AND PRESSURE...

Conventional lubricants burn up at 400°F. So what happens when aluminum and magnesium are die cast at 1300°F.? What happens to die surfaces subjected to the scrubbing effect of 30,000 p.s.i. pressure?

The answers are unpleasant and unprofitable ... surface folds, porosity, bad parting; metal build-up on the die face, and shortened die life.

Hundreds of die casters have found a practical answer in a 'dag'® dispersion of colloidal graphite in water which lays down a thin, tough, heat-resistant film of pure colloidal graphite that penetrates everywhere and stays put. Metal flows smoothly, producing parts cast to closer tolerances with finer finish. Die life is lengthened and toxic fumes are a thing of the past.

An Acheson Service Engineer can show you the many practical benefits of 'dag' colloidal dispersions in your die casting operations. Also write for Bulletin 423 on metal casting and many other applications involving high-temperature lubrication. Address Dept. PMM-7

**dag®**

**ACHESON COLLOIDS COMPANY**

**Port Huron, Michigan...also Acheson Colloids, Ltd., London, England**

**ACHESON COLLOIDAL DISPERSIONS:**

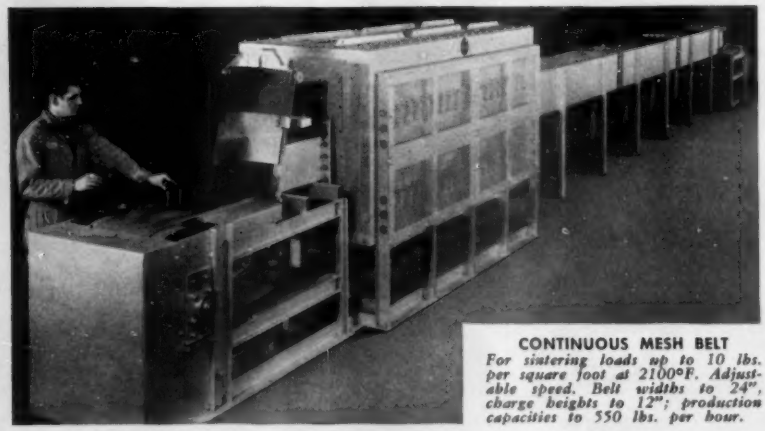
Graphite · Molybdenum Disulfide · Zinc Oxide · Mica and other solids

**Offices in:** Boston · Chicago · Cleveland · Dayton · Detroit · Los Angeles Milwaukee · Philadelphia · New York · Pittsburgh · Rochester · St. Louis · Toronto

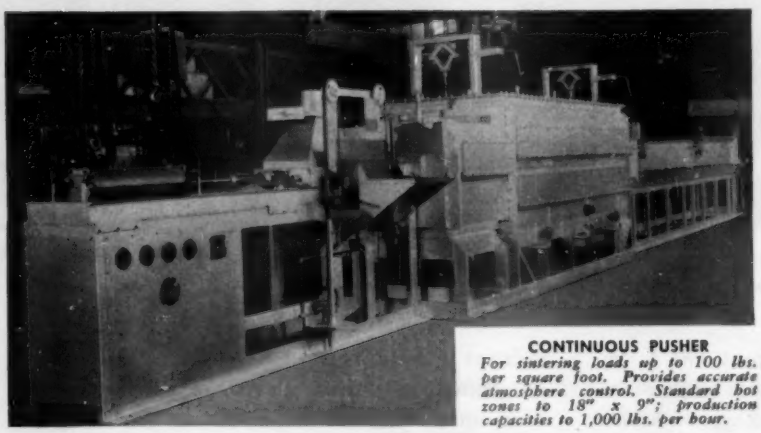
*For more information circle No. 3 on the Reader Service Card*

# HARPER CONTINUOUS SINTERING FURNACES

give you { PROCESS FLEXIBILITY
PRODUCT UNIFORMITY
HIGHER PRODUCTION



**CONTINUOUS MESH BELT**
*For sintering loads up to 10 lbs. per square foot at 2100°F. Adjustable speed. Belt widths to 24", charge heights to 12"; production capacities to 550 lbs. per hour.*



**CONTINUOUS PUSHER**
*For sintering loads up to 100 lbs. per square foot. Provides accurate atmosphere control. Standard hot zones to 18" x 9"; production capacities to 1,000 lbs. per hour.*

If these are the three major qualities you want in a controlled atmosphere sintering furnace, you will find them in a Harper Electric Continuous Furnace. Process flexibility is the result of multiple zone heat control, variable speed drive, and properly applied control instrumentation.

Once the desired conditions have been established, you will obtain complete product uniformity. Conditions outside the furnace being equal, your sintered compacts will be identical hour after hour, week after week.

You will get up to 50% higher production from a Harper Electric Furnace with silicon carbide elements* than from comparable size furnaces using other elements. Another important advantage of these high-power elements is that they can be replaced in an emergency without complete shut-down.

Consider the sintering furnace designed for production. Write for further information today to Harper Electric Furnace Corp., 41 River Street, Buffalo 2, N. Y.

*Nickel chromium elements also available for lower temperature changes.

HARPER ELECTRIC FURNACES

For Continuous Brazing, Sintering, Wire Annealing, Bright Annealing, Annealing, Forging and Research

*For more information circle No. 35 on the Reader Service Card*


## LETTERS

*continued from page 24*

For years the investment casting industry has been trying to live down some of the fantastic claims made for it early in it's history. To combat these claims and give engineering a true picture of our abilities, the Investment Casting Institute, 27 East Monroe St., Chicago 3, Illinois, has recently published a "Design and Engineering Manual" which gives a true picture of what we can do. In this manual we claim no tolerance under 0.003 inch per inch.

We wish your continued success with your magazine. You are doing a fine job.

Sincerely,
K. W. Thompson
K. W. Thompson Tool Co.

### CAST SWITCHGEAR BOXES

One of our Italian clients would like to receive photographs of railway switch boxes and postal boxes made, according to what we are told in the United States, through the die casting process.

Therefore, we should be glad if you could let us know whether in fact these boxes, or similar ones, are made in your country. If so, whether you could send us some illustrations or photographs relating to this equipment. A.T. (Milan, Italy)

*Boxes of the type reader A.T. inquires about are commonly cast in aluminum by die casting, permanent mold casting, shell mold casting and, of course, green sand. Information and sources of illustrations have been forwarded. ed.*

### PRECISION MOLDING EQUIPMENT

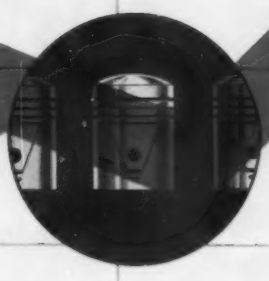
I am contemplating organizing a foundry for die casting and shell molding of aluminum alloys and stainless steels and will, no doubt, enter the metal powder field at a later date.

I am intersted in buying a low capacity die casting machine for my research department for small production runs, the capacity need not exceed 1½ pounds.

On the enclosed card I have circled a few things on which I would appreciate your literature and on any others you might suggest for my information. E.F.K.

*The names of equipment and supply companies in the three fields reader EFK is interested in have been forwarded to him. ed.*

# Castings production up... *from* 18 *to* 128 *pieces per hour per man!*

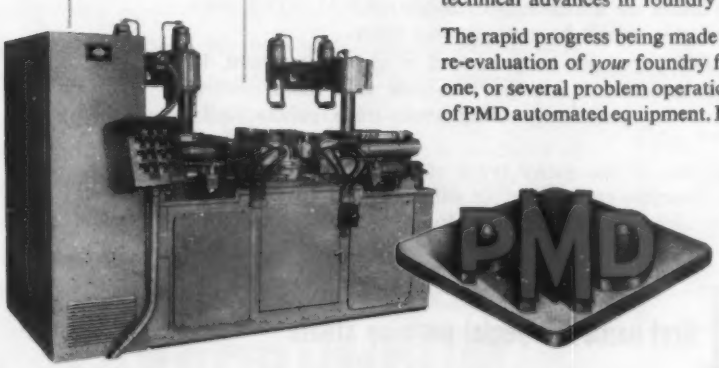


**PMD AUTOMATED MOLDING EQUIPMENT MAKES THE DIFFERENCE**

. . . and in your foundry operation—it could be the difference between profit and loss. Amazing production increases have been achieved in many foundry operations through the application of PMD automated machines and mechanized molding equipment. As one of the leading independent producers of tooling for light alloy molding and casting, PMD has worked closely with foundrymen in the development of automated foundry equipment.

Among these developments is the PMD AUTOMATED PISTON MOLDING MACHINE illustrated below. To provide increased output, lowered unit costs and higher quality castings, PMD applied its experience and engineering know-how to the problem. Result: an increase of over 600% . . . in less floor space, and with marked improvement in piston quality. This is typical of many technical advances in foundry automation pioneered by PMD.

The rapid progress being made in light alloy casting methods warrants careful re-evaluation of *your* foundry facilities and production potential. If you have one, or several problem operations, it will pay you to investigate the advantages of PMD automated equipment. Discuss your requirements with a PMD engineer.




Write today for new PMD reference catalog

PERMANENT MOLD DIE COMPANY, INC.
2273 EAST NINE MILE ROAD
HAZEL PARK, MICHIGAN
SLOCUM 7-8100 (Detroit)

SPECIALISTS IN AUTOMATED FOUNDRY EQUIPMENT AND LIGHT ALLOY TOOLING

*For more information circle No. 54 on the Reader Service Card*

*choose*

# REXALLOY

*cast*

*parts*

*for*

*high strength • corrosion and abrasion resistance • fine finish*

When high-hardness—even at elevated temperatures—resistance to corrosion and abrasion, and smooth, clean finish are important—Crucible REXALLOY® can't be beat. It's a chromium-tungsten-cobalt base nonferrous alloy.

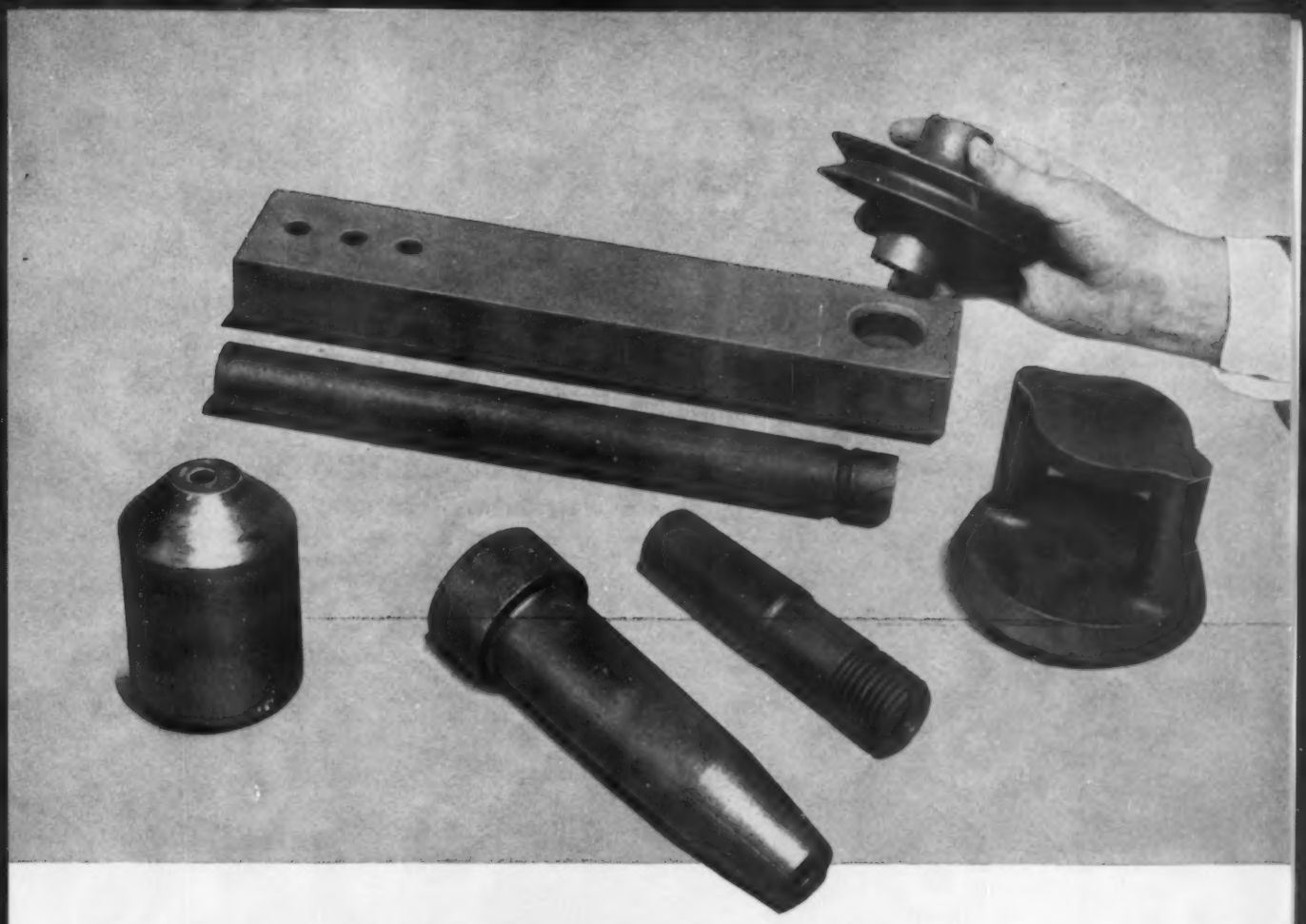
What's more, REXALLOY parts can be produced to close tolerances, in almost any shape, by either investment, sand, or the new shell-mold casting process. Finishing operations are practically eliminated—costs substantially reduced.

Check on the advantages one of the many types of REXALLOY castings has for your product. Your Crucible representative will give you all the facts. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

**CRUCIBLE** first name in special purpose steels

**Crucible Steel Company of America**

*For more information circle No. 22 on the Reader Service Card*



# Molten aluminum can't wet these parts

All these parts and fittings for aluminum die-casting and direct-chill casting are made of REFRAX® silicon-nitride-bonded silicon carbide. All are precisely formed. Yet molten aluminum can't wet them, can't harm them. That alone recommends REFRAX parts and shapes for aluminum holding furnaces and aluminum alloying furnaces (including reverberatory and induction). They are Carborundum's answer to the need for a material that can be formed into intricate parts with outstanding corrosion resistance far above normal melting temperatures.

Consider the value of these other properties in your operation: Tolerances of ±.0005 in./in.; a modulus of rupture of 5600 psi at 2450°F (even the best heat-resistant alloy melts below this temperature); and high heat conductivity that approaches that of chrome-nickel steel. Mail the coupon today for complete information.

**CARBORUNDUM**
Registered Trade Mark

***GET HELP** on your problem . . . write for these 3 booklets:*

**MAIL THIS COUPON TODAY**

**Refractories Division**
**The Carborundum Company, Perth Amboy, N. J., Dept. W77**

**Please send me:**

- ☐ Current issue of Refractories magazine on REFRAX
- ☐ Reprint of article in Product Engineering, Feb. '57 entitled "Nitride-bonded silicon-carbide bridges gap between metals and ceramics".
- ☐ Bulletin on REFRAX

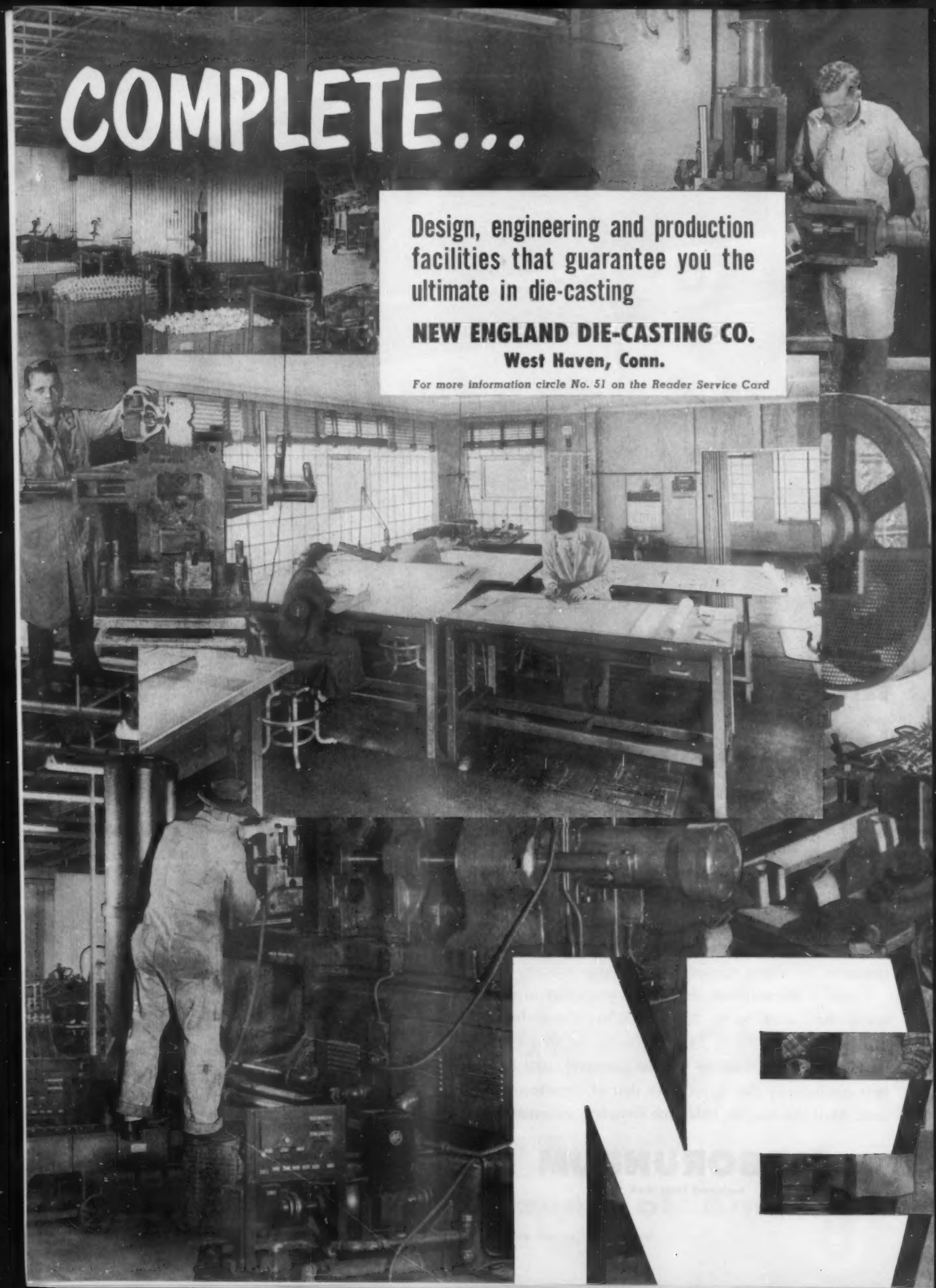
**Name**_____ **Title**_____

**Company**_____

**Street**_____

**City**_____ **Zone**_____ **State**_____

***For more information circle No. 15 on the Reader Service Card***


COMPLETE...
Design, engineering and production facilities that guarantee you the ultimate in die-casting
NEW ENGLAND DIE-CASTING CO.
West Haven, Conn.
For more information circle No. 51 on the Reader Service Card
NE

# Most Manufacturers of Builders' Supplies

*"Without die castings, builders' supplies would be too costly to allow many homes to be constructed with modern built-in conveniences. The use of die castings in the manufacture of these items helps to make possible the high standard of living enjoyed in America today."*

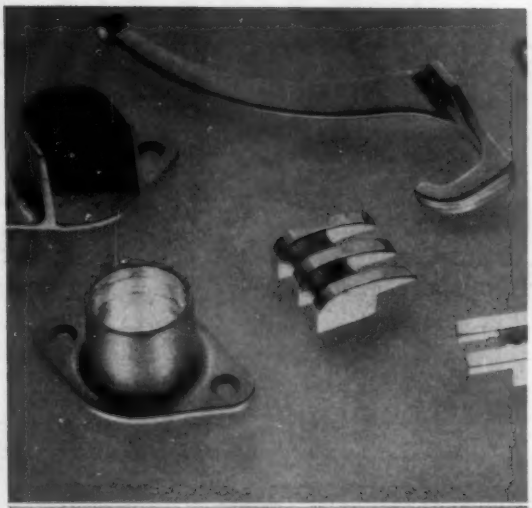
**DIE CASTINGS**

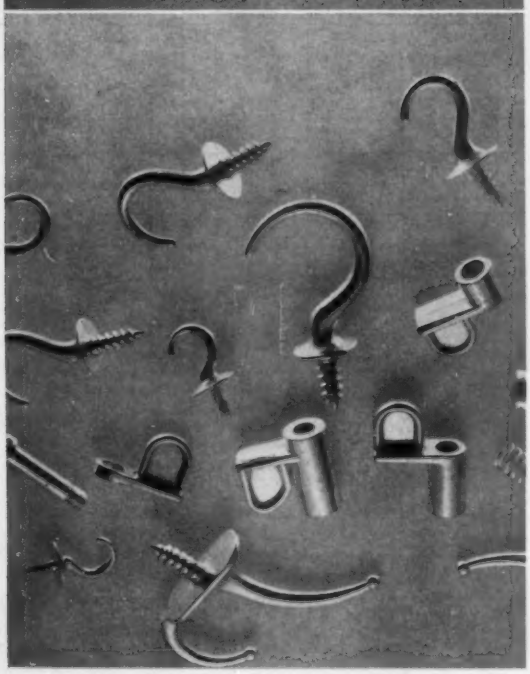
UNLESS a wide variety of die castings were readily available to most manufacturers of builders' supplies, the present, steady upsurge in home-building would be halted from time to time with a frustrating shortage of vital parts.

It would also be plagued with higher costs which might make it difficult for the average American to buy a home. At least a home filled with the modern conveniences that make his standard of living as high as it is.

Die cast parts work around the clock for the ordinary home-owner. They make up the important, often hidden parts of his automatic heating system; they allow him to furnish his house with attractive, efficient, low-cost lighting fixtures; and his cooling system has many built in economical die castings.

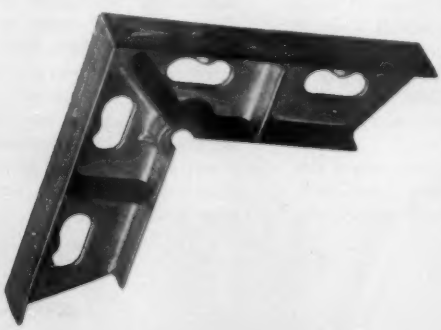
Because of the small amount of machining necessary to finish a die cast part, costs of built in equipment are low. Since it takes only a short time to produce an attractive die casting with a smooth surface, finishing operations can be cut to a very profitable minimum. Only a few of the many applications are shown on the next four pages.





## HARDWARE

Hooks, hangers and other small household devices can often be made more economically by die casting Examples above: top view, from Knape & Vogt, Inc., includes clothes-rod brackets, coat hangers and mirror brackets; lower view, from Gries Reproducer Corp., includes cup hooks, window hardware and similar items.



## Built-in

## STRUCTURAL UNITS

The revolving flange, above, for a built-in lazy susan makes good use of the strength and durability of zinc die castings. A product of Washington Steel Products, this supporting frame is typical of many unseen structural components made of die castings.

## STORM DOORS & WINDOWS

Hidden at the corner joint of most storm windows and doors is a small, zinc die casting which imparts ease of assembly and dependable bracing. Typical of these small, but significant hardware items, is the corner casting, left, produced by the millions by Paramount Die Casting Co.

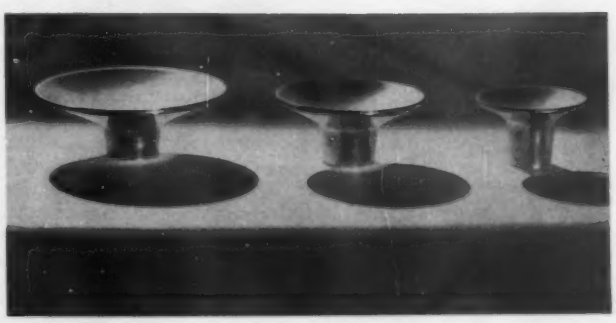
**PLUMBING**

Two particular advantages of die castings are utilized by the manufacturers of plumbing hardware who have found that die cast zinc is durable and less expensive than brass. Quality appearance is obtained with die cast zinc, both as to smoothness of surface and excellent control of detail. Corrosion resistance is the other factor gained by die casting plumbing fittings, such as the series of faucets, escutcheons and corner pieces from American Kitchens Div., Avco Manufacturing Corp., shown above.

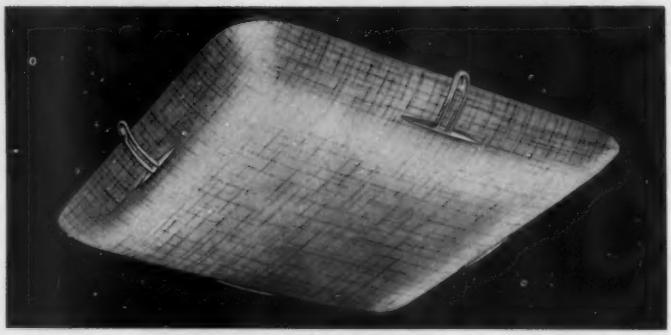
## equipment with die castings help Americans live better

**CABINET HARDWARE**

Among the leading uses for zinc die castings in modern homes is cabinet hardware, including not only drawer pulls of many designs, such as these from Washington Steel Products, but also latching devices, lock sets, hinges and rollers for sliding doors.



# Light, heat and comfort



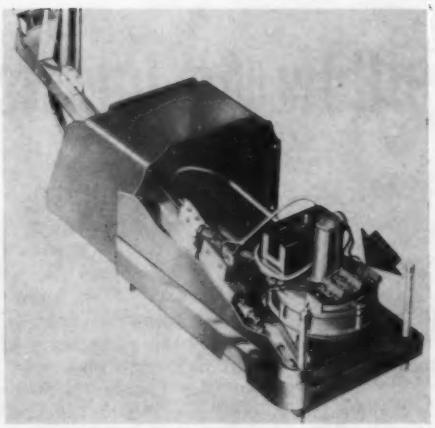
## LIGHTING FIXTURES

Both decorative and structural applications of die castings are to be found in lighting fixtures in today's homes. The built-in lighting units very often employ die cast zinc end brackets, decorative frames, clamps or other holding arrangements. The ability of zinc to take a high quality electroplate results in fixtures attractively finished in chromium, brass, copper, antiqued or even silver. In the field of lamps and other portable lighting devices, die castings also are used for decorative bases and trim, as well as in the adjustable joints for controlling the direction of lighting. Above are shown examples of these various uses of die castings by Lightolier. At left is a lamp tree which includes the swivel joint illustrated above.

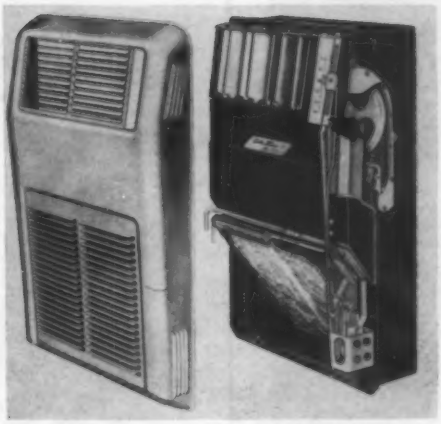
## come from devices built with die castings . . .

Surface Combustion Corp.

York Corp.



Surface Combustion Corp.



Iron Fireman Mfg. Co.

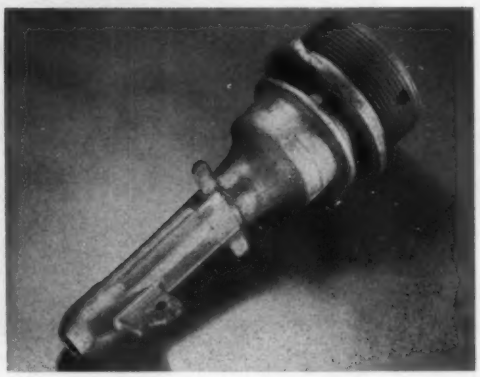
**HEATING & AIR CONDITIONING**

At the heart of every heating, ventilating and air conditioning unit are die castings. Some of these, as illustrated in products of four companies, above, are housings, impellers, main frames, pulleys, drive members, etc. In every case, the long-time serviceability of die cast alloys is an engineering factor considered in the design.

**Some of the 100 sand castings replaced by PERMANENT MOLD castings shown in the illustrations at the right**

**Production shot up, costs went down and sales multiplied when an entire product line was standardized and four components replaced 100 sand castings. This is ....**

1 **CENTER PIN,** once an assembly.



# How An Inefficient

HOW does business modernize itself?

How can it shake off the inefficient habits of more than a quarter of a century, revitalize its production, and offer its customers a brand new, more appealing product?

How can it cut costs at the same time?

These were the puzzling questions tossed on the desk of John Eberly, Chief Engineer of the Thompson Electric Company, of Cleveland, Ohio, by R. K. Farrington, the firm's president. Together the first move made by the two men was to take a long look at the products being manufactured by their company and study them critically. This firm made a fixture known as the *Disconnecting and Lowering Hanger.*

It is used to light factories, airports, aircraft hangars, churches, schools, sports arenas, parking lots, or any place else where the light-source must come from a fixture suspended high in the air.

They saw a confusion of models and fixtures which was difficult for the company's salesmen to describe, and bewildered the customer trying to choose a fixture for his plant.

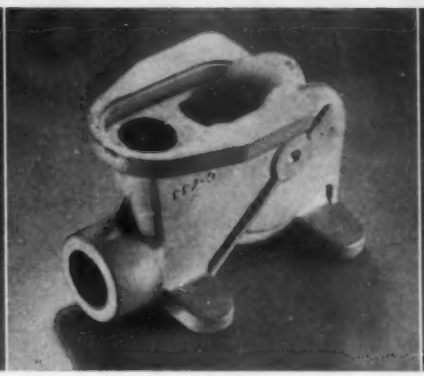
There were seventeen types of disconnecting and lowering hangers. Many of them were custom made as far as production standardization was concerned.

And so their first move was to eliminate all the models which did not sell regularly. Instead of the 17 cumbersome, specialized models his sales force once sold, they now have an attractive quartet which answers all the customer's needs. These four are adaptable,

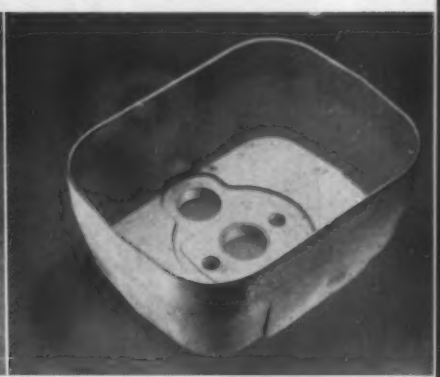
COVER STORY

**2 CONCEALING SHELL,** new part.

**3 PULLEY HOUSING,** used on all.



**4 CANOPY,** mass produced.



# Operation Was Modernized

light-weight, attractive models which are easily installed and maintained.

The early models of the disconnecting and lowering hangers were made of malleable iron and castings.

This meant that they were heavy. It also meant that the fixtures had to be painted to protect them from corrosion. And it meant that many machine operations were necessary.

All these things added up to high costs and a variety of production problems.

The only solution was to abandon the sand casting process and switch to permanent mold wherever the change was economically possible. The first benefit to be gained from the use of permanent mold castings was the combining of formerly assembled components into a single part. Next was the high production rate. The close tolerances possible on permanent mold castings cut machining costs to a minimum. The aluminum castings did not need the finishing operations required to protect malleable iron from corrosion. Chemical cleaning and buffing made the part saleable.

A count of all sand castings used to produce the seventeen models totaled more than 100. This was the reason for the company's inventory and storage problems.

By switching to carefully designed, permanent mold castings based on the results of parts consolidation studies, this hundred or more parts was reduced to *four*. And four was a workable figure.

Needless to say, this vast reduction in the number of parts needed to manufacture a product has a noticeable effect on a business. The entire cost structure was altered.

Many inventory problems evaporated overnight. The headaches of spare parts and maintenance disappeared. Production turned into a predictable routine that could be planned and controlled. Production lines began to move smoothly and the rate of fixture turnout was steady.

Previously, production began when special orders came in for a certain number of fixtures and stopped when the order was filled. Lead time was a problem because parts could not be stored but were ordered from a sand foundry as needed. This slowed delivery of orders. But orders were small then. Now deliveries are made on orders as high as 2500 units at a time.

Deciding which models to re-

*Continued on page 91*

**PRECISION MADE** camera uses many sinterings in its assembly. It is an efficiently operating mechanism which can be produced at low cost.

**IRIS LENS RING** for this electric-eye, 16 mm camera is a sintered compact. This ring is a part of the light control mechanism. Because it is a sintering, it is more economical to manufacture in the large quantities needed in the manufacture of cameras.

# How To Solve

**By Whit Hillyer***

**REASONS FOR DEVELOPING AND USING SINTERINGS:**

One of the fields where the use of sintered compacts in all different metals can expand materially is the photographic equipment field. Here the designer has little leeway since the very nature of the product to be manufactured requires an extremely high degree of precision. He designs, therefore, within the limitations of performance and it is up to the production and procurement men to furnish parts that meet these stiff requirements.

If the designer will think in terms of powder metallurgy he will find that an entirely new field of materials is opened to him. Within very broad limits the density of the parts can be anything desired. The materials of construction may be standard metals and alloys or they may be special "new" materials developed to meet the particular use. The dimensional tolerances can be held to quite exacting requirements and the exactness of duplication from part to part can not be matched by any other manufacturing process.

More specifically, here are seven reasons that Bell & Howell Co. have found for using sinterings.

- Absence of second operation tooling.
- Part durability in actual use.
- Prompt part availability.
- Substantially lower piece-part costs.
- Single part used where machined and assembled parts were formerly used.
- Metallic material easily changed or altered if desired. Permanent lubrication due to porosity of part.
- Maintenance of quality in the finished product presents no problem.

DESIGNING for the consumer market brings the product designer face to face with his greatest challenge.

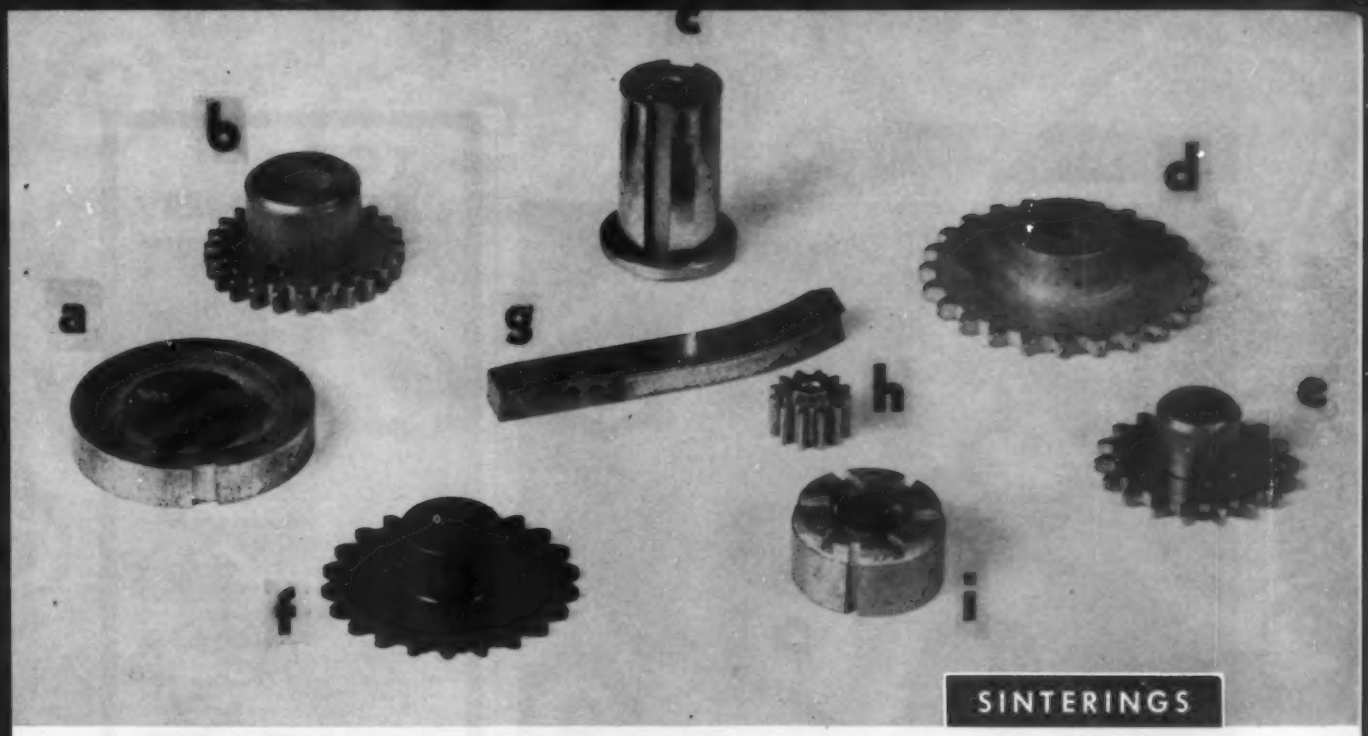
He runs headlong into the problem of creating a product that gives high-priced performance at a cost low enough to attract buyers in the open market.

Such was the problem facing product engineering staff members at the Bell and Howell Co. in Chicago, Illinois, when they began designing an eight-millimeter projector for the broad consumer market.

They found the answer in the use of sintered, powdered metal parts which are produced economically and perform with maximum efficiency. One of their most satisfying applications of iron sinterings was the development and manufacture of the projector cam, figure "a" in above photo.

The part is a double-action cam. It gives a shuttle movement to the shutter and is, in fact, a timer. Its action is critical to the effi-

*Bell and Howell Company




**EXACT DUPLICATION** from part to part is required in these parts for motion picture cameras, projectors and tape recorders. Tolerances range from 0.005 to 0.0005 and are rigidly observed. The individual parts above are: A — iron cam for a projector, B — iron gear for microfilm equipment, C — iron bushing for a projector, D and E — iron gears for a projector, F — iron gear for sound projector, G — iron arm for slide projector, H — bronze gear for camera, I — bronze lens iris ring for electric eye camera.

# Small Parts Production Design Problems

cient operation of an eight millimeter projector and it must be accurate. The sintered part is used as is".

Since the cam was destined for use in a low-priced unit, cost was important. Suggestions that it be machined as a one-piece part were originally considered. Production engineers also thought of making it a multi-piece part.

Considering these suggestions seriously, Bell and Howell submitted them to a detailed cost analysis which showed that costs would be high if either plan went into effect.

Analysis of the required tooling revealed that projected die costs would run high. And the expected die-maintenance was discovered to be almost prohibitive. Above all were the troubling questions: Would the specified dimensions and tolerances be obtained on every part made? Or, would the wear on the dies and tools cause changes so that parts made near the end of a production run would not correspond to those turned out in the beginning?

So, the analysts, product designers, production engineers, and metallurgists began considering the application of sintering for the cam.

Several methods of producing the part in powdered metal where tried. An iron-copper alloy was originally chosen. It had the desirable density of 5.8-6.2, which was more than adequate.

But it was found after many detailed tests and experiments that equally close dimensional control could be obtained when other alloys were used. Further investigation led Bell and Howell's engineers to try several of these.

The result was the choice of an iron-carbon alloy with a density of 5.7-6.1, which gives the desired dimensional control and is the alloy used in production of these cams at the present time.

Copper infiltration of this alloy was contemplated by Bell and Howell's production engineers. They stopped exploration of this possibility after tests showed that infiltration was unnecessary. The regular, non-infiltrated test samples were proven to possess functional and mechanical characteristics which met the exact specifications set for cam production by the firm's engineers.

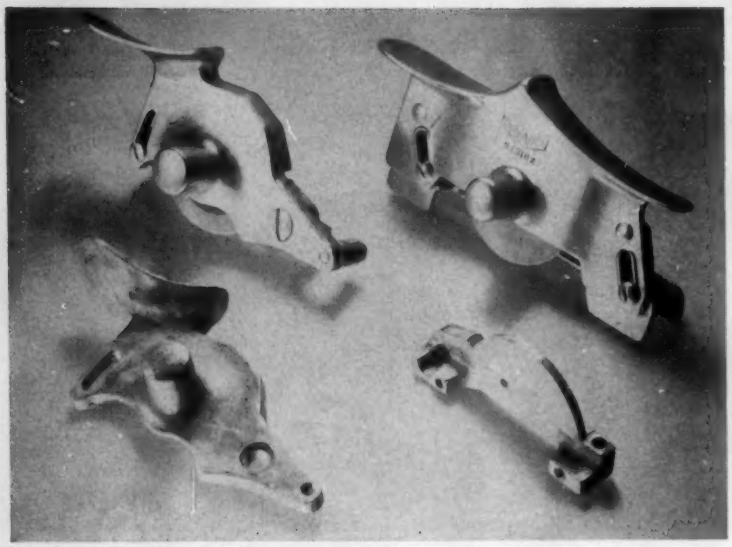
An added benefit from the use of the iron-carbon alloy is its normal porosity. This peculiar characteristic makes it an excellent reservoir for oil. After saturating the part by immersion in oil and allowing it to absorb the lubricant by capillary action, the cam is assembled in the projector. Because it carries oil in its pores, it has thus eliminated the need for further lubrication.

Other problems encountered in the use of the cam were low in number and were easily solved before production runs began. For example, some cracking occurred at the sharp inside fillets on the preliminary samples which were tested on the pilot run.

This defect was easily corrected by adding slight radii wherever such additions were needed.

Another accomplishment of Bell and Howell's production engi-

*Continued on page 69*



**1. ONLY DIE CASTING** can make these tools economically.

# Low Cost Precision Tools

THE craftsman who takes pride in his work will also take pride in his tools. Furthermore, to do fine work, he will buy the best tools that are available. Even though the first cost of the tools may be higher than some of inferior quality, in the long run their greater accuracy over a longer usable life will more than compensate for any initially higher cost.

Sometimes the qualities of a fine tool can be built into one of medium price. In the case of the wall paper trimmers manufactured by the Advance Equipment Mfg. Co., high quality and medium cost are combined because die casting can produce highly accurate finished or semi-finished parts at such a low cost.

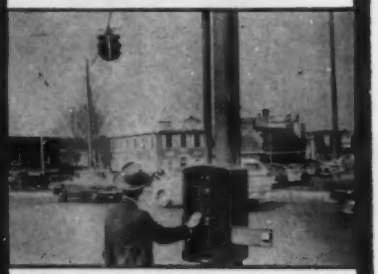
Shown in Figure 1, are two models of wall paper trimmers and the two body castings that make up one model. Except to drill and tap a few screw holes and face the sliding surfaces, the castings are complete as received. Zinc is used as the material of construction for several reasons. Since the cutting wheel rotates relatively slowly, a steel shaft working in a cored hole in the die casting has an adequate bearing. No bronze bushing is needed.

Weight is also important in these tools. Some considerable pressure is required to cut the paper so that any means that will lessen the pressure the workman must apply is reflected in lower fatigue. Among the easily die castable metals, zinc is by far the heaviest and hence for this application the best. Machinability is also an important factor.

The finished tool must be chromium plated. If aluminum were used and simply polished, there would be a tendency for the aluminum oxide to come off on the workman's hands and thus increase the chances of soiling the paper when it is being hung. Paint would wear off rapidly in this service and either zinc or aluminum under the paint would tend to produce soil. Here then is another reason for the use of a zinc die casting, since it can be cast with a surface that requires little buffing and polishing prior to plating and will then take a fine plated finish.

Brass die castings could be used for this application, but have the disadvantage of considerably higher cost, as cast, and require more machining.


**TCB = ?**
**TCB = HB**



**Problem:** What method can best be employed to cast our large Traffic Control Box . . . and who can satisfy our exacting requirements?

**Solution:** Aluminum Permanent Mold Casting . . . by Hampden Brass & Aluminum Co.

This was the solution Eastern Industries, Inc. found to their problem of housing the delicate "brain" of their radar traffic control system.

Pictured here is the end result . . . a non-corrosive, uniquely weather-proof, snug-fitting box, completely safe from tampering.

The permanent mold process was chosen by Hampden because it produces a fine, non-porous casting . . . the surface requiring no preparatory finishing before painting. The box was used as cast, thereby eliminating expensive profile machining for producing the rabbet fit of the box and doors. The high production rate and lower over-all cost of the permanent mold process prove additional advantages. Aluminum was selected for its lightweight and durable qualities.

Remember . . . whether your casting problems are big, tiny, intricate, or special . . . Hampden is ready to effectively solve them with premium quality castings of aluminum or other non-ferrous metals . . . utilizing the sand, permanent mold or die casting method. Our more than 50 years' know-how is your assurance of the best casting techniques to help reduce costs and improve performance.

*Why not contact Hampden Brass & Aluminum Co. on your next casting problem . . . and avail yourself of our engineering counsel?*

Send for brochure, "Behind the Scenes" . . . complete digest of Hampden's experience, equipment and facilities.

HB

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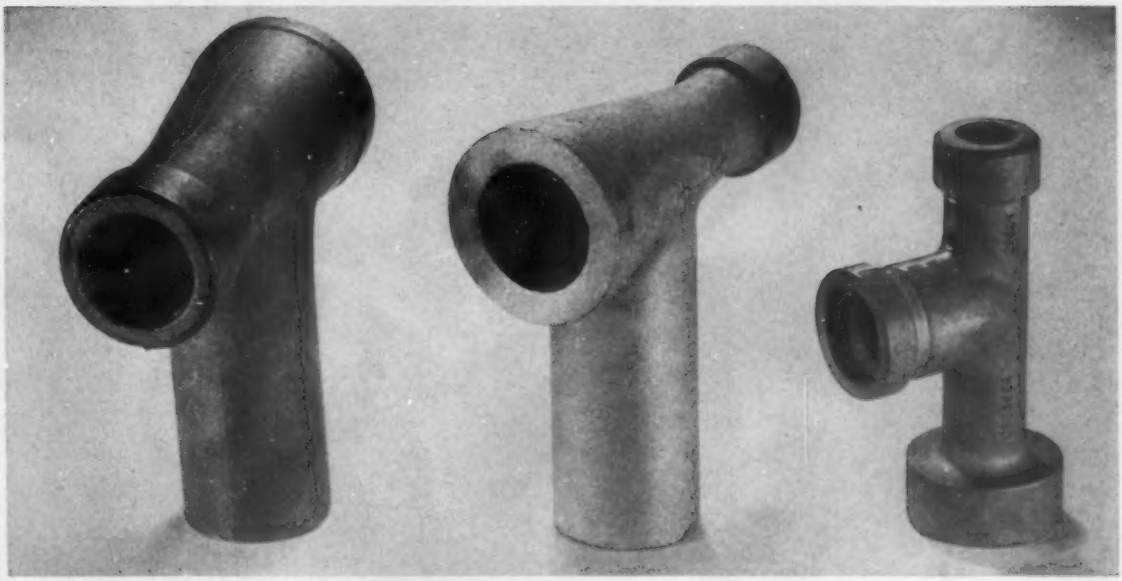


**ROUNDNESS** over a four and one-half inch length is only one of the requirements that the shell mold castings must meet. Pressure tightness, resistance to a wide variety of corrosive agents and easy machinability are some of the other conditions of acceptance.

# Shell Mold Castings Fit Fittings To A "T"

CASTING in brass presents the designer with a corrosion problem, especially if the part is a fitting used on gas and petroleum lines. Once installed, the fitting comes in contact with weather, soil-acids, underground water-soluble corrosive elements, and the erosive action of the soil particles themselves.

Yellow brass can be sand-cast easily but this alloy responds to many of these corrosive tendencies. Red brass SAE-40 will resist these attacks more successfully, thus it is better suited for fittings destined for underground use.

The Standard Brass Foundry Co., of Cleveland, Ohio, specializes in shell mold castings of red brass fittings. Only shell molds seem to give the most satisfactory results. The three Tee-fittings seen above are excellent examples of the superior use of the shell molding process. The two seen on the left are known as the "Plain End" variety.

Although these three Tees seem similar, they have different uses. The two plain-end parts are relatively the same. It is their plain-end, lower tubes which present so many difficulties to the caster. The wall-thickness is ⅛" and this dimension must be held for the entire length of the end. The customer supplies Standard Brass Foundry with a ring gage used to check the diameter. It must be perfectly round for more than 4".

While these fittings are produced at slightly higher cost than green sand castings, they are less expensive after being completely machined.

Sand castings needed machining to size for the entire 4½" of the plain end. Shell mold castings are used "as cast". Tooling costs previous to the shell-molding operation are approximately three times those of making a sand-casting pattern.

But on any run using 200 or more molds four or more times in a year, the cost of shell-mold castings is easily amortized.

When casting the first few of these fittings, swelling distorted the plain end, making it oval. This was corrected by increasing the shell-weight and raising the pouring temperature.

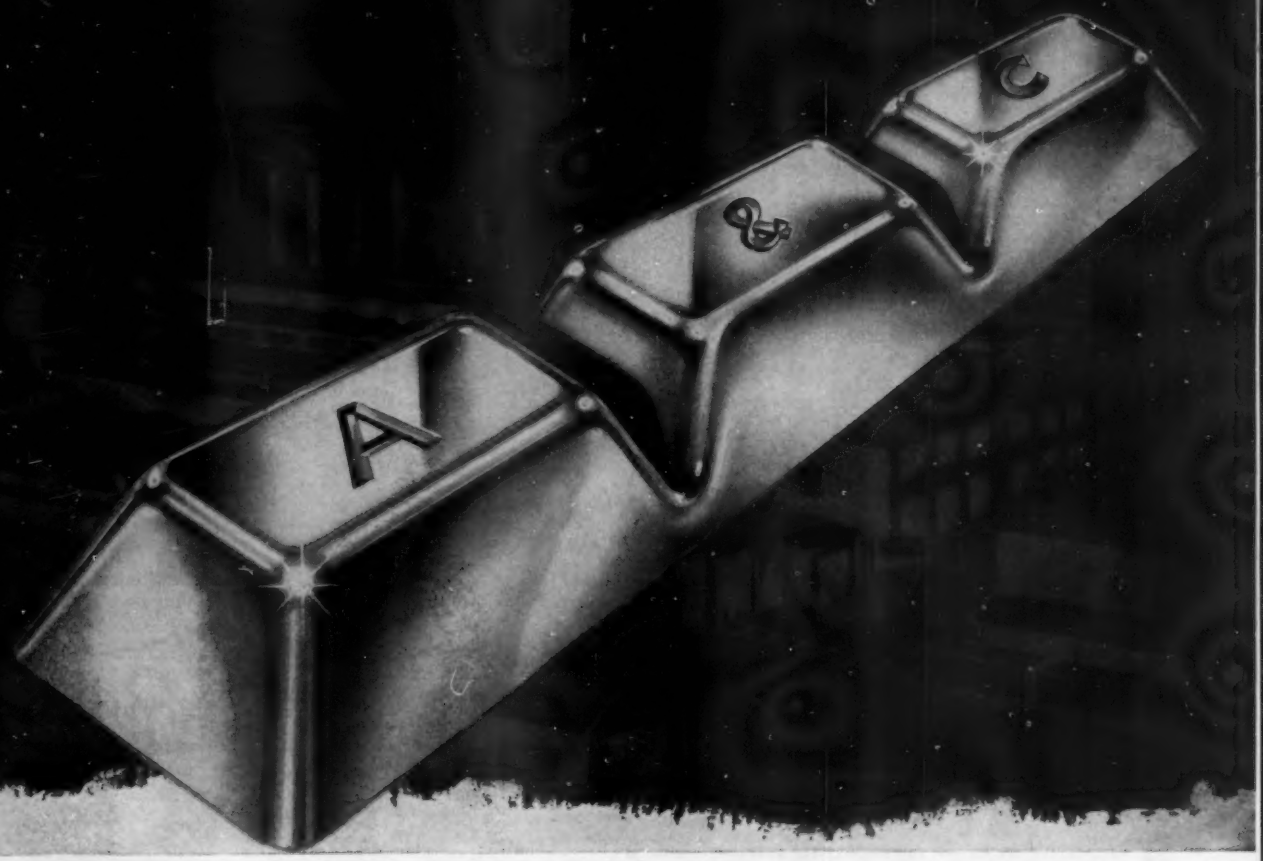
Scrap loss after finishing shell mold cast fittings is approximately 1%. Sand castings reach 12%. This job came to Standard in the usual way. The customer sent in a print, and agreed to order one part. Now he buys complete components in shell.

FOR FOUNDRIES AND DIE CASTERS...

*aluminum casting alloys*

FOR STEEL MILLS...

*deoxidizer aluminum shot, notched bar, shapes, granulated*

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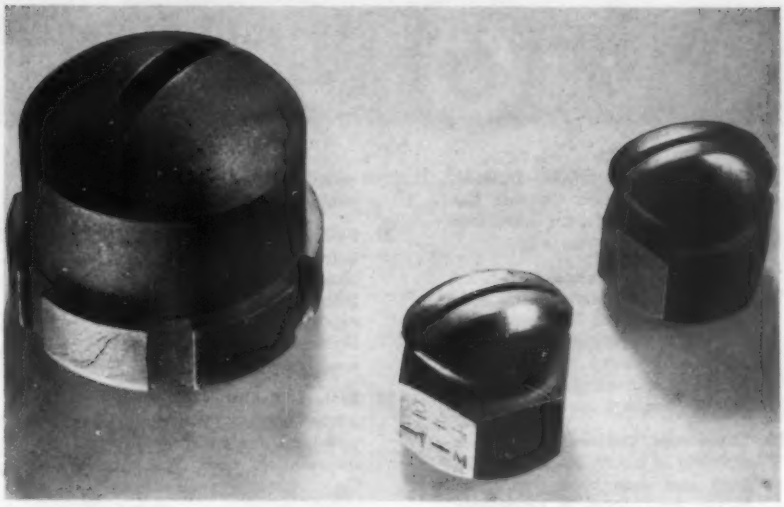

**CONVERSION** from sand castings to investment castings has lowered the cost and improved the quality of these spray nozzles. A further gain is in a wider variety of alloys that may be used, including some classed as non-machinable.

## Here's how this company solved their problems in . . .

# Corrosion and Erosion Resistant Nozzles

**By J. F. Stratty, Jr.***

IN certain chemical applications and for some refinery uses, it is essential that water sprays be used. These sprays are subject to a very high corrosive atmosphere and to erosion due to the high pressure of the water being sprayed.

Three typical nozzles — two in stainless steel and one in beryllium-copper — are shown in figure 1. These nozzles originally were designed to be sand castings, and when made in this manner showed about 50% rejects, especially when the metal from which they were made was either stainless steel or monel metal. There was, further, a very considerable amount of machine work which had to be done in order to finish a sand casting for use.

As they are made today by Precision Metalsmiths, Inc., they are investment cast in type 303 stainless steel, monel metal, and beryllium-copper. They are 100% acceptable as they are received from the investment casting foundry.

Certain of the dimensions on these nozzles are critical, but in all cases standard shop tolerances of $\pm 0.005$ have been found satisfactory. One of the major difficulties encountered when sand castings were in use was smoothness of the spray slot. In nearly every case a clean-up operation had to be done before the nozzle could be used. Since this operation was essentially a milling one, it was expensive. Now this slot is perfectly satisfactory as cast and generally no machine work needs to be done at all, though in some cases a light sanding operation, using an abrasive belt, may be necessary on the radiused surface.

All of the nozzles fasten to the spray pipe with a threaded connection. Because they operate under at least 100 p.s.i. pressure, a class two fit is required. It has been found most economical to cut this thread as a second operation, rather than to attempt to cast it.

The direct labor and material costs for the investment cast nozzles are about the same as for sand cast nozzles in the same metal. However, with the great amount of machining that was necessary on the sand cast nozzles, a very considerably increased overhead burden resulted. This, coupled with the large number of rejects, resulted in a far higher cost for sand cast nozzles finished and ready for installation, than is currently incurred on the investment cast units.

It was noted above that some of the nozzles are cast in beryllium-copper. These are used primarily where corrosive conditions are not severe and the choice of alloy was made by the foundry since beryllium-copper is well known for its castability. Where corrosive conditions are severe, such as in refineries, the life of these nozzles is, generally speaking, less than one year. Because of this short life experimental work is now going on which may lead to the use of Stellite. It is anticipated that if the Stellite nozzles can be made economically, their service life will be very greatly increased.

Experience in the manufacture of these nozzles has shown that no specifications need to be set up, that by simply following good foundry practice, all of the nozzles delivered are satisfactory.

* Planning Manager
National Airoil Burner Corp.

# DATA OFFERED IN THIS MONTH'S ADS

*the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.*

3. **Colloidal Dispersions**—Bulletin 425 from Acheson Colloids Co. describes the different lubricants available for casting use.

5. **Tool Steel**—A concise fact-filled bulletin by Allegheny Ludlum includes certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, etc. of Saratoga tool steel.

10. **"Aluminum Casting Alloys"**—is the title of a new 66-page reference and data book just published by Alloys & Chemicals Mfg. Co.

12. **Die Casting Machines**—A new brochure from B & T Machinery Co. discusses the latest and best developments in die casting equipment. Hot and cold chamber machines for zinc and aluminum, are described.

15. **Three Booklets** — are offered by the Refractories Division of The Carborundum Co. Besides the current issue of Refractories magazine on Refrax and a Bulletin on Refrax, a reprint of the article "Nitride-bonded silicon-carbide bridges gap between metals and ceramics", is offered.

16. **Small Die Casting Machines**—A brochure from Cast-Master, Inc. gives full details and specifications on two new die casting machine models, the 7Z for zinc, tin and lead, and the 7A for aluminum, magnesium and brass.

18. **Metal Melting Facilities**—A new booklet describes the air and vacuum melting facilities available and the alloys and metal forms that can be supplied by Cannon-Muskegon Corp.

19. **Bronze Bearings**—Booklet S-56 from Chrysler Corp., Amplex Div. contains engineering data on more than 1,000 sleeve, flange, and thrust bearings carried in stock.

20. **Entirely New**—Universal die casting machines are described in model 400-N bulletin from The Cleveland Automatic Machine Co.

26. **Universal Testers**—This booklet offered by The W. C. Dillon & Co. gives complete engineering data and price information on an inexpensive tester that can make hundreds of accurate daily checks on metal, plastics, wire, rubber springs, etc.

31. **Boiling Flux**—for eliminating tears, shrinkage and cracks in aluminum permanent mold castings is presented in a technical report, "Advantages of Foseco Dycastal", from Foundry Services, Inc.

32. **Better Stability**—is one of the advantages of "Resistox" metal powders described in detailed information from The Glidden Co.

34. **Aluminum Die Casting**—A brochure entitled "Behind the Scenes" contains a complete digest of Hampden Brass & Aluminum Co.'s experience, equipment, and facilities.

35. **Sintering Furnaces**—Complete information is available from Harper Electric Furnace Corp. on their line of continuous sintering furnaces.

36. **Die Casting Alloys**—A reference handbook, 27-Z, for die casters, designers and engineers on zinc base alloys has been published by Henning Bros. & Smith, Inc.

37. **Investment Casting Design**—A brochure has been published by Hitchiner Mfg. Co. to aid the engineer in designing for the best and most economical use of investment castings.

42. **Electric Furnaces**—Full information is available from Detroit Electric Furnace Div., Kuhlman Electric Co. on two model sizes of rocking electric furnaces to melt ferrous or non-ferrous alloys for research and small production.

43. **Die Casting Machines**—Bulletin No. 101 from Lester-Phoenix, Inc. gives specifications and complete descriptions of their line of die casting machines.

52. **Brass Powder**—Detailed information on the design, properties, production, and application of brass and other non-ferrous powder parts is contained in a manual offered by The New Jersey Zinc Co.

54. **Increased Production**—A new reference catalog published by Permanent Mold Die Co., Inc. describes their automated molding equipment for increased output, lowered unit costs, and higher quality castings.

59. **Vacuum Die Casting**—Full information on the advantages of the "Vacucast" process for zinc die castings is available from Reed-Prentice Corp.

60. **Powdered Metal Parts**—in a range of metals are illustrated in a folder from Reese Metal Products Corp., showing their powder metal facilities.

61. **Iron Powders**—Complete information is available from Republic Steel Corp. on their three grades of iron powder. Included is a description of the powder's "CDF" feature.

62. **Die Cost Savings**—Data sheets available from Richard Tool & Mold Co. describes savings of up to 70 percent on zinc and aluminum die casting with the use of standard "Master Mold" cavity blocks.

67. **Stainless Steel Ladles**—and skimmers for non-ferrous metals are listed in data from Spincraft, Inc. Sizes in stock and prices are included.

68. **Melting Furnace**—Catalog 150 has been issued by Stroman Furnace & Engineering Co. describing their "DC" cylinder type furnaces for combination melting and holding aluminum. The furnaces are equipped with contained combustion chambers.

75. **Direct Tapping**—Full details are available from The Bellows Co., Bulletin OT 50, on cost-savings with their new compact versatile direct tapping unit. This machine features fast accurate tapping without using tapping heads.

53. **Plaster Mold Castings**—A new brochure from Ohio Precision Castings, Inc. contains interesting information on economical production of small parts.

76. **Abrasives Catalog**—of the Gratex Manufacturing Co., lists the complete line of Gratex rubberized abrasives and features detailed information on improving quality and savings in finishing.

78. **Hydraulic Presses**—Complete information on hydraulic presses, including special and "modified standard" models of great

*Continued on page 96*

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- ☐ Powder Metal Parts
- ☐ Permanent Mold Castings
- ☐ Plaster Mold Castings
- ☐ Shell Mold Castings
- ☐ None of these

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| 1 | 18 | 35 | 52 | 69 | 86 | 103 | 120 | 137 | 154 | 171 | 188 | 205 | 222 | 239 | 256 | 273 | 290 |
| 2 | 19 | 36 | 53 | 70 | 87 | 104 | 121 | 138 | 155 | 172 | 189 | 206 | 223 | 240 | 257 | 274 | 291 |
| 3 | 20 | 37 | 54 | 71 | 88 | 105 | 122 | 139 | 156 | 173 | 190 | 207 | 224 | 241 | 258 | 275 | 292 |
| 4 | 21 | 38 | 55 | 72 | 89 | 106 | 123 | 140 | 157 | 174 | 191 | 208 | 225 | 242 | 259 | 276 | 293 |
| 5 | 22 | 39 | 56 | 73 | 90 | 107 | 124 | 141 | 158 | 175 | 192 | 209 | 226 | 243 | 260 | 277 | 294 |
| 6 | 23 | 40 | 57 | 74 | 91 | 108 | 125 | 142 | 159 | 176 | 193 | 210 | 227 | 244 | 261 | 278 | 295 |
| 7 | 24 | 41 | 58 | 75 | 92 | 109 | 126 | 143 | 160 | 177 | 194 | 211 | 228 | 245 | 262 | 279 | 296 |
| 8 | 25 | 42 | 59 | 76 | 93 | 110 | 127 | 144 | 161 | 178 | 195 | 212 | 229 | 246 | 263 | 280 | 297 |
| 9 | 26 | 43 | 60 | 77 | 94 | 111 | 128 | 145 | 162 | 179 | 196 | 213 | 230 | 247 | 264 | 281 | 298 |
| 10 | 27 | 44 | 61 | 78 | 95 | 112 | 129 | 146 | 163 | 180 | 197 | 214 | 231 | 248 | 265 | 282 | 299 |
| 11 | 28 | 45 | 62 | 79 | 96 | 113 | 130 | 147 | 164 | 181 | 198 | 215 | 232 | 249 | 266 | 283 | 300 |
| 12 | 29 | 46 | 63 | 80 | 97 | 114 | 131 | 148 | 165 | 182 | 199 | 216 | 233 | 250 | 267 | 284 | 301 |
| 13 | 30 | 47 | 64 | 81 | 98 | 115 | 132 | 149 | 166 | 183 | 200 | 217 | 234 | 251 | 268 | 285 | 302 |
| 14 | 31 | 48 | 65 | 82 | 99 | 116 | 133 | 150 | 167 | 184 | 201 | 218 | 235 | 252 | 269 | 286 | 303 |
| 15 | 32 | 49 | 66 | 83 | 100 | 117 | 134 | 151 | 168 | 185 | 202 | 219 | 236 | 253 | 270 | 287 | 304 |
| 16 | 33 | 50 | 67 | 84 | 101 | 118 | 135 | 152 | 169 | 186 | 203 | 220 | 237 | 254 | 271 | 288 | 305 |
| 17 | 34 | 51 | 68 | 85 | 102 | 119 | 136 | 153 | 170 | 187 | 204 | 221 | 238 | 255 | 272 | 289 | 306 |

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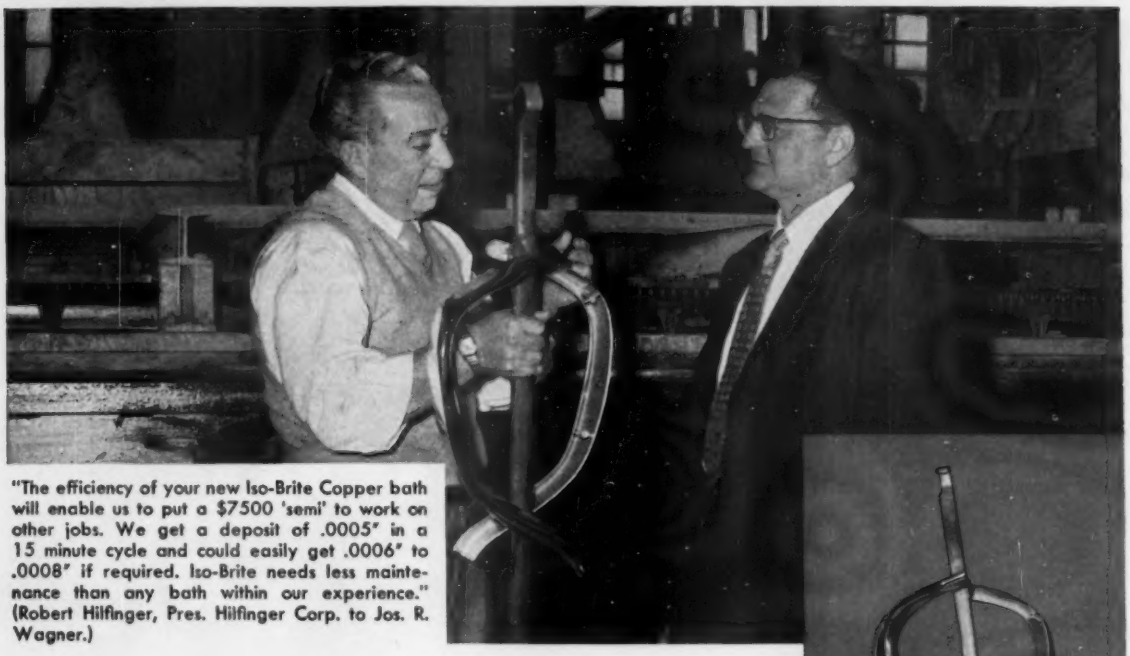
# Finishing Section

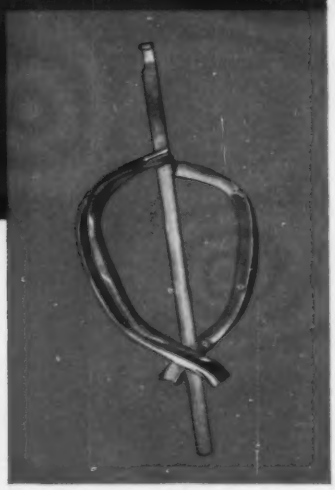
The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

Barrel finishing has its own nomenclature . . .

# WAGNER ISO-BRITE COPPER . . .



"The efficiency of your new Iso-Brite Copper bath will enable us to put a $7500 'semi' to work on other jobs. We get a deposit of .0005" in a 15 minute cycle and could easily get .0006" to .0008" if required. Iso-Brite needs less maintenance than any bath within our experience." (Robert Hilfinger, Pres. Hilfinger Corp. to Jos. R. Wagner.)



Die cast automotive grill part ready for nickel and chrome.

# doubles

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5. Freedom from roughness
6. Wide operating range—temperature 135-165°; up to 60 amperes per square foot
7. High tolerance of organic contamination

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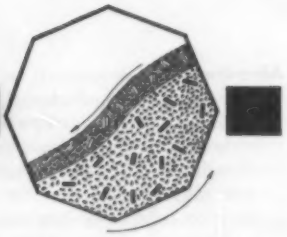
BARREL FINISHING



MEDIA

WORK-HARDENING

MEDIA

FIXTURE BARREL

BURNISHING

NEUTRALIZER

SCREEN SEPARATOR

ABRASIVE

# A Glossary Of Barrel Finishing Terms

**An Industry-Wide Cooperative Project**

SUBMERGED BARREL

COMPOUND

TURNOVER POINT

TILTING BARREL

MICROINCH FINISHING

IN 1956 The Norton Company, in their booklet "Barrel Finishing", published a glossary of common barrel finishing terms. Inquiry among the manufacturers of barrels, barrel finishing supplies, and users of barrels for finishing die castings, indicated that this glossary had not received the publicity it deserved.

Further inquiry revealed that there was a considerable divergence of opinion concerning certain of the definitions. The editors of PRECISION METAL MOLDING believed that a common language should be made available to the manufacturers of barrels and barrel finishing supplies, as well as to the users of the barrels and supplies, and with this thought in mind, circularized the original Norton glossary among all of the manufacturers of equipment and supplies.

The results of this work are published below. In most cases there was a sufficient unanimity of opinion to allow the selection of a single definition for a term. In a few cases noted, an alternate definition has been given since no clear-cut majority favored either one or the other. Several of the companies suggested the addition of certain terms or the deletion of others. No deletions have been made, and those terms which were suggested as additions to the basic glossary are given, as a separate list, to indicate that they are additions on which only one opinion has been secured.

In spite of inability to arrive at a group of definitions satisfactory to everyone concerned, it is felt that publication of this glossary now will be a material aid to the barrel finishing industry. In the few cases where an alternate definition has been given, inquiry will quickly determine which definition is meant.

Certainly it is true that by the use of terms within the meanings given, a common ground for manufacturers, suppliers, and users will rapidly result, so that each will understand the other more completely than in the past.

If future work results in clarification of the terms now in doubt, the glossary will be republished.

The editors wish to express their thanks to the following companies who helped prepare this group of definitions: The Abbott Ball Co., BMT Mfg. Co., Baird Machine Co., The Carborundum Co., Casalbi Co., The Exolon Co., Grav-I-Flo Corp., Frederick Gumm Chemical Co., Hartford Steel Ball Co., Inc., Magnuson Products Corp., Minnesota Mining & Mfg. Co., The Norton Co., Oakite Products, Inc., Queen Stove Works, Inc., Almco Div., Rampe Mfg. Co., Roto-Finish, Inc., The Esbec Barrel Finishing Corp., Speed-D-Burr Corp., Rutley Industries, and Wyandotte Chemical Co.

*(The original glossary was compiled by The Norton Co. in cooperation with The Esbec Barrel Finishing Corp. and Grinding and Finishing Magazine.)*

**Abrasive** — A mineral, either natural or manufactured, generally having a crystaline structure which lends itself to abrading. The gross particle size may range from fine powders to relatively large pieces.

(Several companies have suggested that the term be changed to "Abrasive Media." The majority, however, agree with the term as given since the term Media is defined later and the connection between the two becomes apparent.)

**Abrasive Compound** — A material, usually in dry powder form, containing abrasive grains and chemicals. The abrasive grains are usually finely divided and may be of one or more than one type. The material may be used in conjunction with abrasive of larger size or alone for self tumbling.

**Acid Compound** — A material with a pH under 7, used for removal of heavy rust, scale and for quick heavy cutting when used with an abrasive.

**Alkaline Compound** — A material with a pH of more than 7 generally consisting of a mixture of detergents and soaps, used primarily to keep parts clean during cutting-down operations.

**Barrel-Finishing** — The mass processing of large or small parts in a rotating barrel containing abrasive and/or compounds, for finishing operations such as descaling, rust removal, deburring, flash removal, grinding, burnishing, color improvement, low microinch surface, radii forming, degreasing, rust inhibiting, cleaning, etc.

**Bottle Barrel** — A special shape of tilting barrel which is shaped like a bottle with a rounded polygonal bottom and a narrow neck or mouth.

**Brightening** — The removal of surface oxidation and soil by the use of either an acid or alkaline type compound to restore the natural color of the metal.

**Bright Dipping** — A chemical dipping, sometimes performed before ball burnishing to remove oxides and, in the case of aluminum die castings to etch out alloying agents from the surface and leave substantially pure aluminum to be subsequently ball colored.

**Burnishing** — A non-abrasive polishing operation to improve color, luster and surface smoothness by rolling down surface irregularities and closing pores in the metal. No metal is removed in the operation.

**Burnishing Media** — Usually hardened steel balls or shapes used with or without compound to produce a burnished surface.

**Burnishing Barrel** — A barrel used primarily for burnishing. Usually made of sheet steel or cast iron and provided with a lining of neoprene, plastic, rubber or wood.

**Burnishing Compound** — A special compound, often composed of soaps and/or detergents, used to give the necessary lubricity for satisfactory burnishing. In some cases, other chemicals may be added to give the desired color or luster.

**Charge** — The total contents of a barrel when fully loaded. This will include the work pieces, water, abrasive, compounds, balls, or what ever must be added to perform the job.

**Closed Barrel** — A barrel that is completely closed so as to be both water and air tight during operation. It must be stopped to load or unload as contrasted with a tilting barrel (which see).

**Color** — The actual color of the metal as differentiated from the luster or brilliance of the surface.

(alt) Most commonly used to describe the surface reflectivity of a metal before, during and after finishing. This color is usually used as a means to determine whether the part has been brought to a desired finish. Less frequently used to describe the color of the metal itself as seen on a matte surface.

**Coloring** — The act of producing the desired color on a metal part.

**Compound** — Any additive used in barrel finishing other than water, media and work pieces.

(alt) That part of the charge which controls the quality of the work accomplished.

**Cut-Down** — An abrasive operation to reduce the size of a part, to remove heavy tool, die or grinding marks, to deburr, to improve the finish or to generate radii.

**Cycle** — The length of time the parts are processed.

**Deburring** — Removal of burrs.

**Descaler** — A compound, either acid or alkali, used in a barrel, for removal of heavy scale and rust through chemical action in addition to grinding or rubbing action.

**Diagonals** — Round steel or zinc wire, cut at a 45 degree angle, into sections as long as the diameter of the wire.

**Dimensional Separator** — A mechanical device for separating parts from media which cannot be separated magnetically or by screening. Also for grading abrasive media and for separating part from part.

**Dispersion** — Distribution of parts within the barrel charge.

**Fines (of abrasive)** — Abrasive material smaller than #120. Often the finely divided material that wears off of the larger pieces of abrasive media. May also refer to the sludge formed by the wear of the abrasive media.

**Fixture** — A rack or support used to hold work parts in the barrel.

**Fixture Barrel** — A barrel specifically designed to accommodate parts supported and held on fixtures.

**Fracturing** — The breaking up of abrasive media during operation of the barrel.

**Grading**—The separation of media into standard size ranges by means of screens or dimensional separators.

**Grinding** — A barrel finishing operation designed specifically for the removal of surface stock from the parts being treated. This should not be confused with flash and burr removal operations. Similar to cutting down, (which see).

**High Water** — Water several inches above the top of the load.

**Hoist Pan** — A loading or unloading pan, often mounted on wheels or casters, used in the mechanical loading and unloading of barrels.

**Horizontal Barrel** — A barrel whose axis of rotation is parallel to the floor, or is level.

**Impingement Marks** — Nicks, scratches and other defects caused by parts bumping each other while the barrel is in operation or during either charging or discharging of the load.

**Layer on Layer** — A specific method of loading parts and media in alternate layers.

**Level Water** — Water even with the top of the charge of parts and media.

**Lodging** — The wedging of media particles in holes or crevices.

**Low Water** — Water level below the surface of the complete charge.

**Luster** — The reflective brilliance of the surface of the part.

**Magnetic Separator** — A separating device, often equipped with an automatic demagnetizer, for separating ferrous and nonferrous parts.

**Masking** — The plugging or covering of holes, threads and other critical areas to prevent lodging and/or marking.

**Mass** — The total volume of media and parts in a load.

**Media** — Any material that is used to perform work on the parts or to prevent impinging. May be either abrasive or non abrasive and does not include water and compounds.

**Microinch Finishing** — The creation of a surface of specified smoothness (or roughness), measured as the average (RMS) deviation from a theoretically perfect flat.

**Neutralizer** — Any compound or substance used to create a non-acid or non-alkaline condition in the barrel.
(alt) A material used to create and maintain a pH (which see) of 7 in the barrel.

**Oblique Barrel** — See tilting barrel.

**Open-End Barrel** — See tilting barrel.

**Peening** — To pound down or roll over burrs rather than to grind them off.

**pH** — A unitless number used to express the hydrogen ion concentration of the barrel charge. An acid condition is expressed by a pH below 7, and alkali condition by a pH above 7 and a neutral state by a pH of 7.

**Radius Forming** — The rounding off of sharp corners and edges. May or may not be to a specified radius.

**Riddle** — A hand screen, often round, used to separate work from media or to separate media into specified sizes.

**Rinsing** — Flushing residue from the mass before proceeding to the next operation or before adding a new compound.

**Rinsing Door** — A perforated tumbling barrel cover to permit rinsing without removing the load. Also called a washout door and may be equipped with a hose connection.

**Screen Separator** — A device employing screens of known and different mesh sizes used for separating work parts and/or media.

**Sizing** — See grading.

**Stones** — See media.

**Storage Bin** — A receptacle for storing media when not in use and from which it may be discharged into a hoist pan.

**Submerged Barrel** — A unit with a horizontal, perforated drum which revolves in a tank containing a solution of water and burnishing or cleaning compound.

**Tilting Barrel** — A barrel with an open end. In operation the open end is up to prevent discharge, but the barrel may be tilted to discharge while in operation. This type of barrel may be both charged and discharged while in operation.

**Tubbing** — A term peculiar to the jewelry trade. Similar to a submerged barrel, (which see).

**Tumbling** — See barrel finishing. Often refers to older methods of barrel finishing prior to the advent of precision barrel finishing methods.

**Tumbling Barrel** — Sometimes used to describe any type of barrel used in barrel finishing. Not generally accepted now.

**Wedging** — See lodging.

**Work Hardening** — Surface hardening of work pieces by the action of the media.

## SUGGESTED TERMS

The following terms have been suggested by one or more companies as proper additions to a barrel finishing glossary. No industry wide action has been taken yet on these terms.

**Additive** — A compound of any sort or a plain loose abrasive.

**Balicones** — A shape which combines the actions of balls and cones.

**Balls** — The shape most commonly used in barrel finishing media. When of hardened steel they are used for burnishing; as unhardened steel they are often used, with abrasives and compounds, for cutting-down, deburring, descaling and radii generation. Ceramic and other abrasive media are also made in this shape.

**Bonded Shapes** — Abrasive grains bonded together into special shapes to be used as media.

**Charging** — See impregnation.

**Chip Bin** — See Storage bin.

**Chips** — See media. Often refers to media made from naturally occurring materials graded to various sizes.

**Cleaner** — A chemical compound designed to keep parts oxide free during the cut-down run.

**Cutting Barrel** — A barrel used for deburring and heavy cut-down operations; often unlined.

**Hardened Steel Shapes** — Metal shapes employed with compound for burnishing action. Such shapes include pins, diagonals, balls, dual balls, ellipse balls, etc.

**Impregnation** — Coating or imbedding of parts by abrasive during barrel finishing operations.

**Loading** — Excessive smoothing or filling of the pores of the abrasive media rendering them ineffective for cutting operations.

**Load Height** — The level of the total load, media and parts, in the barrel.

**Neutralizing** — The addition of some agent to a barrel charge to counteract the effect of either acid or alkaline media or compounds.

**Neutral Compound** — A compound (or cleaner) having a pH of 7.

**Polishing** — A barrel finishing operation to remove tool, die or grinding marks. Generally little or no metal is removed.

**Slide** — The downward movement of the mass in the barrel during rotation past the turnover point. Much of the abrasive and/or burnishing action occurs during the slide.

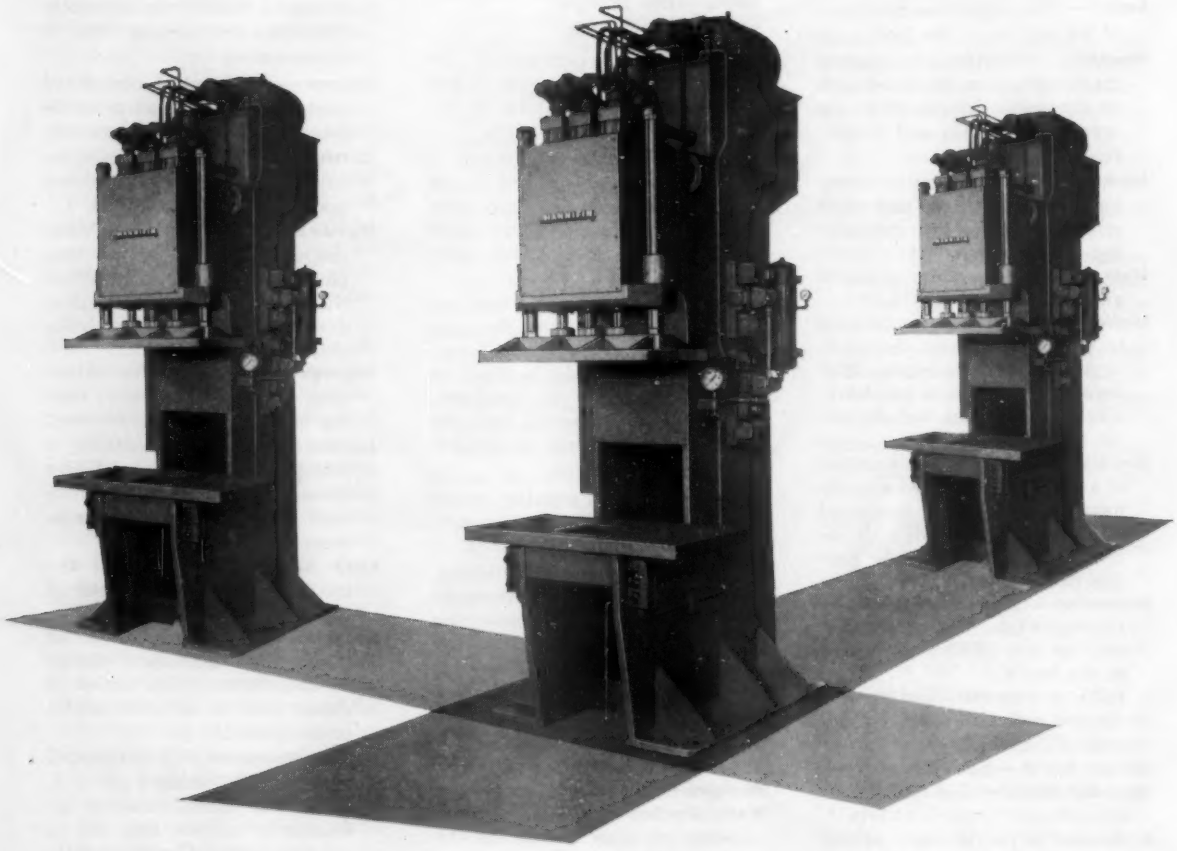
**Slugs** — See diagonals.

**Specific Shapes** — Usually a manufactured abrasive media having a predetermined shape and size.

**Turnover Point** — The height along the side of the barrel at which the mass stops its upward movement and slides toward the lower part of the barrel.

**Work Load** — The parts to be finished as distinguished from media, compound, water, etc.

# Why they trim more castings per hour with Hannifin hydraulics



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## For the best results at the lowest cost . . .

# Choose The Proper Belt and Wheel

ONE of the very basic tools used in the surface finishing of metal parts is the abrasive belt. Because of the almost infinite variety of the belt sizes and grits that are available it is hard to conceive of a metal part or shape that cannot be surface finished, at least partially, with abrasive belts.

Whether the metal removal be the smoothing down of heavy flash, parting lines or excess weld metal or simply fine polishing of a good die cast surface there is a belt and an associated compound to do the work quickly, economically and efficiently.

Perhaps the simplest application of an abrasive belt is the drum type grinder. Here a belt is placed over a contact wheel and some method used to tighten the wheel against the belt to hold it firmly in place. From this drum type machine it is only a step to the use of longer belts utilizing a driven wheel and a back-stand idler. With this type of equipment finishing can be done on the portion of the belt which contacts the wheel; a flat or contoured platen over which the belt runs may be provided; or the work may be done against the unsupported belt (strapping).

These two types of abrasive belt machines are the basis of practically all general purpose and special machines that are built to use abrasive belts (1).

But the successful use of any type of equipment using abrasive belts depends on the proper selection of both the belt and the contact wheel. For the most part, the length of the belts will be fixed by the machine on which they are used. Belt width will be fixed by the maximum capacity of the machine and by the work to be done.

The "grit" of the belt and the type of contact wheel used are, however, susceptible to considerable latitude. All to often the choice is left to the operator who, because of his experience, is presumed to be able to make the proper choice. Actually the operator often will not change belts when the work changes because of the extra labor involved. Further he may not know that a different type of abrasive, a different contact wheel or a different grit would do a far better job with considerably less effort and time on his part.

(1) For a brief description of many of the standard and special abrasive belt machines see Production Machines For Coated Abrasives; PRECISION METAL MOLDING; March, 1957; page 68.

Loading of abrasive belts is probably one of the greatest factors in determining belt life. Here, the proper selection of contact wheels will determine the rate of metal removal, particularly when the work piece bears on the belt directly over the wheel.

There are many reasons that could be given to demonstrate the necessity of selecting the proper abrasive belts and contact wheels. It is sufficient to say that all these factors add up to doing a better grinding or polishing job at the lowest possible cost.

The following charts are given as a general guide only. Not all materials that are to be ground and/or polished have been covered, nor are all of the different abrassive belts that are currently available listed.

Almost all of the companies who make belts or contact wheels, operate grinding and polishing laboratories. Where doubt exists as to the best belt or wheel to be used samples and complete data may be submitted for test and recommendation. With this information, the proper abrasive belt and contact wheel can be recommended to give the required end result.

**For Selection Charts**
**See pages 56 and 57**

# Choose Wheels and Belts From These Charts

| | SURFACE | MATERIAL | HARDNESS AND DENSITY | PURPOSES | WHEEL ACTION | COMMENTS |
|---|---|---|---|---|---|---|
| | Cog-tooth | Rubber | 70-90 Durometer | Grinding | Fast cutting, allows long belt life. | For cutting down projections like weld beads, gates, risers sprues. |
| | Standard serrated | Rubber | 40-50 Durometer medium density | Grinding | Removes stock but leaves rough to medium ground surface. | For smoothing or blending cut-down projections or surface defects. |
| | X-shaped serrations | Rubber | 20-50 Durometer | Grinding and polishing | Flexibility of rubber allows entry to contours. Medium polishes and light stock removal. | Same as for standard serrated wheels but preferred for the softer, non-ferrous materials. |
| | Plain face | Rubber | 20-70 Durometer | Grinding and polishing | Plain wheel face allows controlled abrasive grain penetration. Softer wheels give better finishes. | For large or small flat faces. |
| | Flat flexible | Compressed Canvas | About nine densities going from very hard to very soft | Grinding and polishing | Hard wheels can remove metal, but not as quickly as cog-tooth rubber wheels. Softer wheels polish to fine smoothness. | Good for medium range grinding and polishing. |
| | Flat flexible | Solid sectional canvas | Soft, medium and hard | Polishing | Gives uniform polishes. Avoids abrasive pattern on work. Adjusts to contours. Can be preformed for contours. | A low-cost wheel with uniform density at the face. Handles all types of polishing. |
| | Flat flexible | Buff section canvas | Soft | Contour polishing | For fine polishes and finishing. | Can be widened or narrowed by adding or removing sections. Low cost. For all types of polishing. |
| | Flat flexible | Sponge rubber inserts | 5-10 Durometer Soft | Polishing | Gives uniform polishes and finishes. Polishes and blends contours. | Has replaceable segments. Polishes and blends contours. Segments allow density changes. |
| | Flexible | Fingers of canvas attached to hub | Soft | Polishing | Gives uniform polishes and finishes. | |
| | Flat flexible | Rubber segments | Varies in hardness | Grinding and polishing | Grinds or polishes depending on density and hardness of inserts. | For portable machines. Uses replaceable segments that save on wheel costs and allow density changes. |
| | Flat flexible | Inflated rubber | Air pressure controls hardness | Grinding and polishing | Gives uniform finishes. | Adjusts to contours. |

Because conditions in shops vary, the data in these tables may have to be changed slightly for some jobs.

*Courtesy of Behr-Manning Co., A Division of Norton Co.*

| MATERIAL | OPERATION | ABRASIVE | GRIT | BELT SPEED sfpm | LUBRICANT | CONTACT WHEEL | |
|---|---|---|---|---|---|---|---|
| | | | | | | TYPE | HARDNESS durometer |
| Hot and Cold Rolled Steel | Grinding | Aluminum oxide | 24-60X | 4000-6500 | Dry or light-bodied grease | Cog-tooth, serrated rubber | 70-90 |
| | Polishing | Aluminum oxide | 80-150 | 4500-7000 | Dry or light-bodied grease | Plain or serrated rubber sectional or finger-type cloth wheel, free belt | 20-60 |
| | Fine Polishing | Aluminum oxide | 180-500 | 4500-7000 | Heavy grease or grease with abrasive compound | Smooth-faced rubber or cloth | 20-40 |
| Stainless Steel | Grinding | Aluminum oxide | 50-80 | 3500-5000 | Dry or light-bodied grease | Cog-tooth, serrated rubber | 70-90 |
| | Polishing | Aluminum oxide | 80-120 | 4000-5500 | Dry or light-bodied grease | Plain or serrated rubber sectional or finger-type cloth wheel, free belt | 30-60 |
| | Fine Polishing | Silicon carbide | 150-280 | 4500-5500 | Heavy grease or oil mist | Smooth-faced rubber or cloth | 20-40 |
| Aluminum, Cast or Fabricated | Grinding | Silicon carbide or Aluminum oxide | 24-80 | 5000-6500 | Light grease | Cog-tooth, serrated rubber | 70-90 |
| | Polishing | Silicon carbide or Aluminum oxide | 100-180 | 4500-6500 | Light grease | Plain or serrated rubber sectional or finger-type cloth wheel, free belt | 30-50 |
| | Fine Polishing | Silicon carbide or Aluminum oxide | 220-320 | 4500-6500 | Heavy grease or grease with abrasive compound | Plain faced rubber, finger-type cloth or free belt | 20-50 |
| Copper and Copper Alloys | Grinding | Silicon carbide or Aluminum oxide | 36-80 | 2200-4500 | Light-bodied grease | Cog-tooth, serrated rubber | 70-90 |
| | Polishing | Silicon carbide or Aluminum oxide | 100-150 | 4000-6500 | Light-bodied grease | Plain or serrated rubber sectional, finger-type cloth wheel, free belt | 30-50 |
| | Fine Polishing | Silicon carbide or Aluminum oxide | 180-320 | 4000-6500 | Light grease or grease and abrasive compound | Same as for polishing | 20-30 |
| Non-Ferrous Die Castings | Grinding | Silicon carbide or Aluminum oxide | 24-80 | 4500-6500 | Light-bodied grease | Hard wheel depending on application | 50-70 |
| | Polishing | Silicon carbide or Aluminum oxide | 100-180 | 4500-6500 | Light-bodied grease | Plain rubber, cloth or free belt | 30-50 |
| | Fine Polishing | Silicon carbide or Aluminum oxide | 220-320 | 4500-6500 | Heavy grease or grease with abrasive compound | Plain or finger-type cloth wheel or free belt | 20-30 |
| Cast Iron | Grinding | Aluminum oxide | 24-60 | 2000-4000 | Dry | Cog-tooth, serrated rubber | 70-90 |
| | Polishing | Aluminum oxide | 80-150 | 4000-5500 | Dry | Serrated rubber | 30-70 |
| | Fine Polishing | Aluminum oxide | 120-240 | 4000-5500 | Light-bodied grease | Smooth-faced rubber | 30-40 |
| Titanium | Grinding | Aluminum oxide or Silicon carbide | 36-50X | 700-1500 | Sulphur-chlorinated grease stick | Small diameter, cog-tooth serrated rubber | 70-80 |
| | Polishing | Silicon carbide | 60-120X | 1200-2000 | Light-bodied grease | Standard serrated rubber | 50 |
| | Fine Polishing | Silicon carbide | 120-240 | 1200-2000 | Light-bodied grease | Smooth-faced rubber or cloth | 20-40 |
| Inconel X<br>Inconel 700<br>Nimonic 80<br>Nimonic 100<br>Nimonic 90<br>Stellite 27<br>Waspalloy<br>Hastelloy | Grinding | Aluminum oxide | 24-50X | 4000-5500 | Sulphur-chlorinated grease stick | Smooth-faced steel or cog-tooth serrated rubber | 70-90 |
| | Polishing | Aluminum oxide | 40-100X | 4000-5500 | Light-bodied grease | Serrated rubber | 70 |
| | Fine Polishing | Aluminum oxide | 100-150X | 4000-5500 | Light-bodied grease | Smooth-faced rubber | 50 |
| S-816 | Grinding | Aluminum oxide | 24-50X | 4000-5500 | Sulphur-chlorinated grease stick | Smooth-faced steel or cog-tooth serrated rubber | 70-90 |
| | Polishing | Aluminum oxide | 40-100X | 4000-5500 | Light-bodied grease | Serrated rubber | 70 |
| | Fine Polishing | Aluminum oxide | 100-150X | 4000-5500 | Light-bodied grease | Smooth-faced rubber | 50 |

# USEFUL LITERATURE, CATALOGS, MANUALS

*any of these technical publications may be obtained by circling the appropriate numbers on the Reader Service Cards, Pages 48-49*

## PMM PROCESSES

**Aircraft Quality Steel Castings:** 154
**Lebanon Steel Foundry** — 4 page brochure and a 4 page reprint. The Cerimacast process for making molds for precision casting of any metal is described. The process features a silicate mold material bonded with ethyl silicate.

**Small, Intricate Die Castings:** 155
**Gries Reproducer Corp.** — 3 illustrated design brochures. The Intercast process for making die castings is described and some of the many parts made are well illustrated.

**Aluminum Castings:** 156
**Fabricast Div., General Motors Corp.** — 14 page booklet. The four different methods for casting aluminum that are currently being used are described. Die casting, permanent mold casting, sand casting and investment casting are described and typical parts illustrated in detail.

**Die Castings:** 157
**Doehler-Jarvis Div., National Lead Co.** — 6 page brochure. Some of the many types of die castings that have been made are described and illustrated. An alloy selection chart to help pick the best alloy for the job is included.

**Sinterings:** 158
**Dixon Sintaloy, Inc.** — 4 page brochure and 5 technical data sheets. A general discussion of the parts that can be made from metal powders. The data sheets give the chemistry and physical properties of both ferrous and non-ferrous parts.

**Cost Reduction Data:** 159
**Casting Engineers, Inc.** — Catalog 120, seven pages. Data on investment castings, design information and a listing of the metals and alloys that can be cast are included.

**Non-Ferrous Castings:** 160
**Howard Foundry Co.** — 64 page specification and design catalog (issued in three sections). These three catalog sections cover the casting of magnesium, aluminum and brass and alloy steel and iron. Metal specifications and both mechanical and physical properties are given.

**Investment Casting Design Tips:** 161
**Hitchiner Mfg. Co.** — Hitchiner Engineering Slants — An external house organ designed to give helpful design information to the user of investment castings.

**Designing for Die Castings:** 162
**The Hoover Co.** — 7 page design folder. The advantages of die castings, how they are made and how they should be designed are given. Chemical and physical specs. are included.

**Vacuum Die Casting:** 163
**The Cleveland Hardware & Forging Co.** — 4 page brochure and 4 page semi-technical report. A description of the vacuum die casting process and a report on the many advantages gained by casting parts at reduced pressures.

**Gray Iron Permanent Mold Castings:** 164
**Foundry Div., Eaton Mfg. Co.** — 17 page brochure. A complete description of the possibilities of gray iron permanent mold castings. Included are examples, technical data, chemistry and typical photomicrographs.

**Magnesium and Aluminum Castings:** 165
**Bendix Foundries Div., Bendix Aviation Corp.** — 22 page report on the six different casting methods that are used to produce precision parts. Technical and design data are included.

**Brass & Aluminum Castings:** 166
**Hampden Brass & Aluminum Co.** — 20 page descriptive booklet. A detailed description of the company, its different casting processes and associated facilities.

**Plaster Mold Castings:** 167
**Universal Casting Corp.** — Four separate reports. Descriptions of the plaster mold casting process, the many different kinds of parts that can be made and a data sheet giving the chemistry and properties of the alloys commonly plaster mold cast.

**Copper Base Die Castings:** 168
**Pressco Casting & Mfg. Corp.** — Three 2 page reports on the advantages of applications of copper base die castings. A listing of castable alloys is included.

**Shell Mold Castings:** 169
**Lynchburg Foundry Co.** — Four 1 page reports on gray iron and ductile iron shell mold castings.

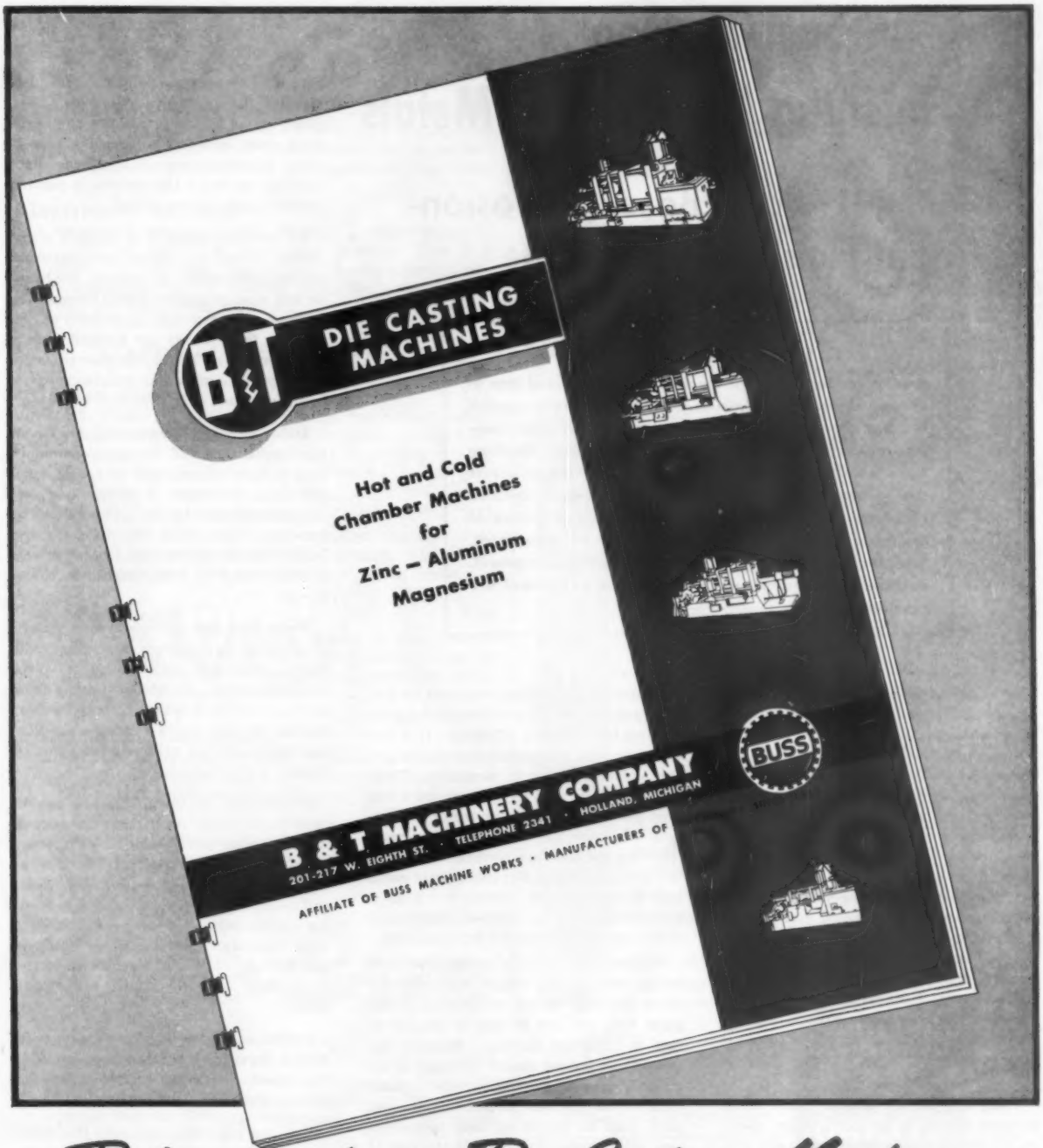
**Plaster Mold Castings:** 170
**Morris Bean & Co.** — 4 page descriptive folder. Examples of parts that have been cast by the Antioch Process together with a short description of the method and some of the advantages and limitations are given.

**Shell Mold Castings:** 171
**Grede Foundries, Inc.** — 2 page brochure — Some of the advantages of the shell mold casting process are discussed. Examples of simple and intricate parts cast in shell molds are given.

**Permanent Mold Castings:** 172
**Aluminum Permanent Mold Co.** — 4 page folder — The many advantages of the permanent mold casting process for production of parts in aluminum are discussed.

**Investment Castings:** 173
**Scott Casting & Mfg. Corp. Div., Rolle Mfg. Co., Inc.** — 14 page report — A detailed discussion of the investment casting process its advantages and economies.

*Continued on page 61*

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*Advertisement*

# Special Reports On Finishing Non-Ferrous Metals

## NUMBER II—Paint Base, Corrosion-Resistant Finishing with Iridite

### WHAT IS IRIDITE®?

**Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.**

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a good paint base and decorative finishes for non-ferrous metals. However, continued developments have been so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can obtain proper surface preparation for painting and increase product durability with a single multi-purpose chemical pretreatment. Report I on decorative, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, it is an accepted fact that metal surfaces should be prepared before painting to make possible an efficient paint system. Naturally, this preparation should provide for good initial paint adhesion. Chemical treatments have proved extremely effective in this respect, particularly those of a neutral or preferably acid nature. Further, to be most efficient, chemical treatments should provide a non-porous barrier to maintain adhesion by sealing the metal from the paint and moisture. They should also provide a self-healing film which prevents lateral corrosion in the event that bare metal is exposed through scratching.

The Iridite chromate conversion coatings meet all these requirements. Iridite is a chemical conversion treatment for surface preparation. It provides initial paint bonding by molecular adhesion. It is acid in nature and produces a film that is gel-like and non-porous in structure. Thus, the Iridite film effectively seals the metal from the paint and from moisture penetration. Because the film contains certain relatively soluble constituents, it will protect areas scratched through to bare metal and prevent lateral corrosion. This is accomplished by a gradual leaching of these constituents into the damaged area.

Further, because of its gel-like, non-crystalline nature, the Iridite film will not affect the appearance or texture of the paint film, nor will it dust or powder to mar the painted surface. Because the film is non-porous, paint coverage is increased, thus substantial savings in paint costs will be realized. In addition, treated parts may be stored for long periods of time prior to painting without the risk of entrapped moisture causing blistering when painting.

Iridite chromate conversion coatings are widely used with equal ease and success under both baked and air-dried paint systems. While the actual adherence properties of the Iridite film do not increase appreciably with its thickness, corrosion protection does. The protection of the Iridite film is proportionate to its thickness and should be taken into consideration when selecting the Iridite to meet your needs. However, it is sometimes necessary to sacrifice maximum corrosion protection for appearance when a finished part is to be only partially painted. For example, it may be desirable to use a thin, clear, bright Iridite film if the unpainted areas must present a chrome-like appearance. A typical case is that of instrument housings on which the exterior is painted and the inside left unpainted.

On the other hand, if all surfaces of the product are to be painted and maximum corrosion protection is required, the heavier and most protective Iridite films should be used. For example, all surfaces of zinc die cast fruit juicers are finished with a highly protective Iridite film prior to painting to provide maximum resistance to the corrosive action of fruit juices.

Iridite finishes are now available for all commercial forms of the more commonly used non-ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. In addition to providing an excellent base for paint, the Iridite films also have high decorative value when used as final finishes in themselves.

These films can produce a wide variety of pleasing appearances including clear bright, iridescent yellow, bronze, olive drab and brown. In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to their functions as protective and decorative finishes, and as bases for organic finishes and bonding compounds, Iridites have low electrical resistance. Some can be soldered and welded. The film does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

*For more information circle No. 73 on the Reader Service Card*

## DATA IN ADS

*continued from page 58*

**Engineered Castings:** 174
**The Eastern Malleable Iron Co.** — 4 page brochure — A brief description of how engineered casting service can improve products and cut manufacturing costs.

**Investment Castings:** 175
**Arwood Precision Casting Corp.** — 16 page report — A Critical Survey of Investment Castings. This is a highly factual report; the process, alloys, accuracy, advantages and design. Written particularly for the design and production engineers.

## MATERIALS & EQUIPMENT

**Casting Alloy:** 176
**P. R. Mallory & Co., Inc.** — 4 page brochure. A short description of the various castable alloys supplied by the company. Some technical data is given for three of the materials.

**Metal Working Lubricant:** 177
**Lubikold Co.** — 2 page report. A short description of a new lubricant for machining all metals. Said to reduce machining costs and give a superior finish.

**Mold Lubricant:** 178
**Bel-Ray Co., Inc.** — Technical report. A report on a graphite base mold lubricant reported not to smoke or burn. Recommended for die casting, permanent mold casting and similar applications.

**Commercial Humidifiers:** 179
**Abbeon Supply Co.** — 4 page brochure. A description of several different types of commercial humidifiers and a short report on humidification.

**Immersion Thermocouple:** 180
**The Bristol Co.** — A report on a new immersion thermocouple for use at high temperatures in molten metals. Temperatures up to 3100 F can be measured.

**Metal Putty:** 181
**Carl H. Biggs Co.** — A report on an epoxy-based putty for repairing metal parts. Recommended for use in filling blow holes, small surface cracks, etc. in non-critical areas.

**Torque Testing Fixture:** 182
**P. A. Sturtevant Co.** — 4 page brochure. A description of a newly designed torque testing fixture for general inspection use. Numerous examples of how the device may be employed are shown.

**Remelt Furnace:** 183
**Nolan Corp.** — 12 page report plus extra descriptive sheets. A remelt furnace originally designed for use on type metal. Can be used equally satisfactorily on low melting point die casting metals such as zinc, lead and tin. Available in pot capacities from a low of 600 lbs. to 10 tons.

**Thermocouple Protective Tubes:** 184
**Thermo Electric Co., Inc.** — 4 page bulletin D. A concise description of some of the many different types of thermocouple protective tubes available. All tubes are metal and are available in stock types and sizes or as built up to specifications.

*Continued on page 62*


DO YOU NEED BETTER METAL CLEANERS FOR THESE JOBS?

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| 1 | **How to clean aluminum before anodizing.** See pages 4 to 8. |
| 2 | **How to prepare aluminum for welding.** See pages 10 to 14. |
| 3 | **How to prepare aluminum for painting.** See pages 15 to 19. |
| 4 | **How to clean aluminum before and after heat treating.** See page 20. |
| 5 | **How to strip paint from aluminum.** See pages 22 to 26. |
| 6 | **How to clean magnesium.** See pages 27 to 29. |
| 7 | **How to install cleaning tanks and spray-washing machines.** See pages 31 to 35. |
| 8 | **How to control overspray in paint booths.** See pages 36 to 37. |
| 9 | **How to clean engine test cells.** See page 40. |

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## DATA IN ADS

*continued from page 61*

**Automatic Air Filter:** 185
**Emco Pneumatic Corp.** — Illustrated technical literature is available on an all new ½" fully automatic air filter. Designed to remove moisture, sludge, and other heavier than air foreign substances. For use ahead of air operated tools and devices.

**Mold & Die Components:** 186
**Detroit Mold Engineering Co.** — DME News. An external house organ that describes new and better mold and die components for die casting and plastic injection dies.

**Non-Destructive Testing:** 187
**Dayton X-Ray Co.** — A descriptive brochure dealing with both the services the company can offer in the field of non-destructive testing and the equipment they handle, for sale.

**Gauges and Barometers:** 188
**Precision Thermometer & Instrument Co.** — 4 page, two color catalog. A description and illustrations of the mercurial barometers and vacuum gauges, vacuum pump gauges and absolute pressure gauges manufactured by the company.

**Furnace Atmosphere Controls:** 189
**C. I. Hayes, Inc.** — 2 page catalog sheet. A brief description of the built-in atmosphere control methods developed by the company. Called the "certain curtain" it is said to effectively prevent oxidation and decarb.

**Vacuum Die Casting Machines:** 190
**Reed-Prentice** — Descriptive literature on the "Vacucast" system as applied to Reed-Prentice die casting machines. The advantages of vacuum die casting are discussed.

**Zirconium Oxide:** 191
**Zirconium Corp. of America** — 4 page illustrated bulletin. Detailed information on zirconium oxides, including applications, types and manufacturing methods. Tables list physical properties.

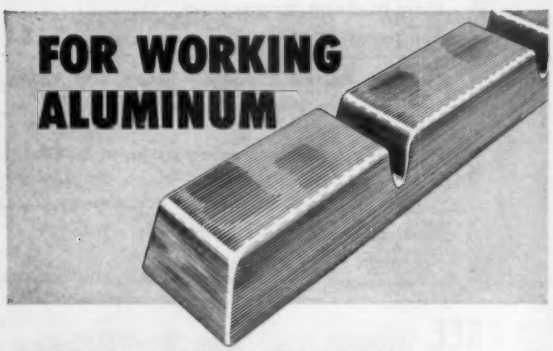
**Mass Spectrometer:** 192
**Consolidated Electrodynamics Corp.** — 4 pages, catalog sheets. An announcement and description of a new, portable mass spectrometer. Complete technical data on the new instrument are given.

**Vacuum Melted Alloys:** 193
**Cannon-Muskegon, Inc.** — 7 page booklet, series 71. An engineering report on the advantages, uses and economics of vacuum cast alloys for investment casting.

**Specifications for Copper & Copper Alloys:** 194
**The American Brass Co.** — Publication B-34, 28 pages. A new and enlarged edition of Copper & Copper-Alloy Specifications Index. The book is divided into three parts for easy reference. This is a complete reference of copper and copper alloys.

**Controlled Atmosphere Furnace:** 195
**C. I. Hayes, Inc.** — 4 page brochure. A description of the "Hump Back" controlled atmosphere continuous conveyor type furnace for bright heat treatment of stainless steel, copper brazing, etc. Is especially useful for sintering powdered metal parts.

*Continued on page 64*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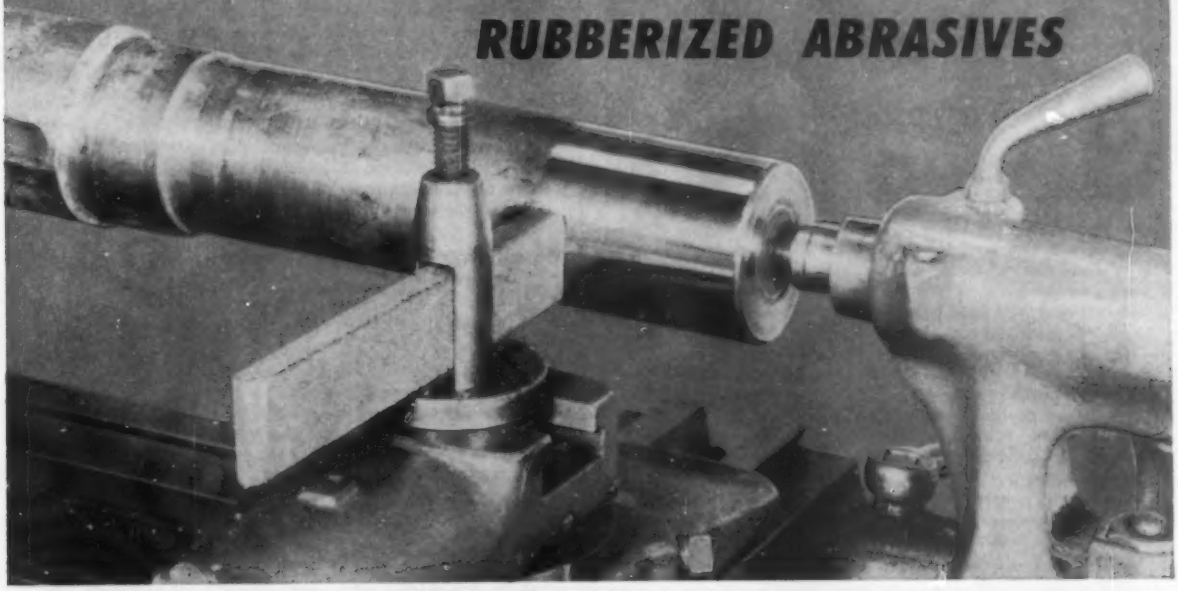

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Polishing hard to reach spots on stainless steel with grinding wheels and emery paper proved too slow with poor results. Cratex cones Nos. 1340-C, 1359-C, 1340-M and 1359-M produced a highly polished, scratch-free surface much faster. Easy cleaning and less danger of bacterial contamination resulted.

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Final finishing of molds for glass reinforced plastic articles was unsatisfactory for efficient pressure molding and product appearance. Cratex 112-M and 216-M wheels and 1358-M cones produced the required fine finish and greatly reduced or eliminated finishing on molded articles and improved product appearance.

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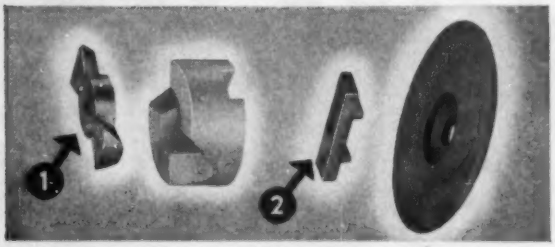
# MEETING DESIGN NEEDS

## BRASS POWDER FORMS IMPORTANT CONNECTION FOR WESTERN ELECTRIC

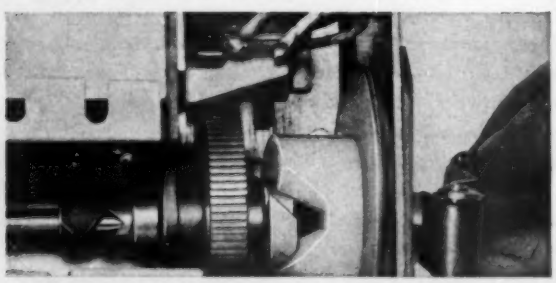



The Clutch Coupling (1) and Bar Coupling (2), shown above, function with two insulators to form an important drive linkage in Western Electric's "lineman's test set". These BRASS POWDER parts perform the dual role of activating a signaling generator and retaining a molded nylon cam that insulates the handle up to 10,000 volts.

The complex, curved surfaces on the blades of the Clutch Coupling would be very difficult and expensive to machine from bar stock. For this reason, Western Electric designed both of these parts for the powder metal process and turned the job over to an experienced fabricator*. Thus, unit cost was very low, high performance standards were met and much valuable machining time was saved.

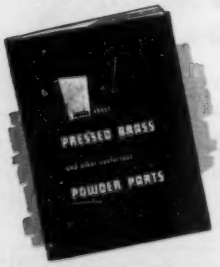
Consult with a metal powder fabricator when you have difficult design problems—or when you simply want to lower your production costs with BRASS POWDER sinterings.

*Parker White-Metal Company, Erie, Pa.



Detail of the Clutch Assembly on Western Electric's signaling generator. The Bar Coupling turns the Nylon Cam which pushes the Clutch Coupling forward to engage the drive gear.

## How Can BRASS AND NICKEL SILVER POWDER PARTS Meet Your Design Needs?




For detailed information on the design, properties, production and application of brass and other nonferrous powder parts you should have a copy of our manual. It will give you 20 case histories of brass and nickel silver powder structural parts to assist in evaluating this means of production in terms of your particular needs.

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**Resistance Wire for Heating Elements:** 196
**Hoskins Mfg. Co.** — 12 page catalog M-55D. A full description of Chromel-D heating element alloy. Listed are complete prices and specifications on wire, ribbon, and furnace strip. Useful tables pertinent to furnace design are included.

**Corrosion-Resistant Alloys:** 197
**Haynes Stellite Co.** — 104 page book on Hastelloy. This book gives the latest available information on Hastelloy B, C, D and F. Included are compositions, physical, mechanical and high temperature properties. Comparative resistance charts and corrosion resistance tables are included.

**Flexible Hose Assemblies:** 198
**Aeroquip Corp.** — Bulletin ES280, 13 pages. A short text devoted to the proper installation of flexible hoses in all sorts of assemblies. Both right and wrong methods of installation and support are described and illustrated. A must for every user of hose.

**Beryllium Copper Cavities:** 199
**Standard Tool Co.** — 1 page catalog sheet. A brief description of beryllium copper cavities and cores for all types of precision casting methods and for plastic injection molds.

**Beryllium Copper Ingot:** 200
**The Brush Beryllium Co.** — 4 page brochure, bulletin 3. The chemistry, physical and mechanical properties of both beryllium copper and beryllium nickel are given. Included is a brief description of all of the different grades available.

**Aluminum Casting Alloy:** 201
**Samuel Greenfield Co., Inc.** — 7 page catalog. A thorough description of a self-ageing, high strength aluminum alloy 55G. A comparison of the chemistry and properties of this alloy with several others is given.

**Aluminum Alloys:** 202
**American Alloys Corp.** — 4 page folder plus a wall chart. The uses, chemistry and physical and mechanical properties of AZA, an aluminum-zinc-magnesium casting alloy, are discussed. This is a low silicon alloy reported to be anodizable.

**Abrasive Belt Machines:** 203
**Minnesota Mining & Mfg. Co.** — Descriptive literature about standard and special machines using abrasive belts is available. Most recently issued is a description of a machine used for grinding the ID of large diameter tanks.

**Coloring Copper and Copper-Alloys:** 204
**Enthone, Inc.** — A discussion of a new finish for all copper and copper-alloy parts is available. The new treatment produces brown on copper and most alloys. On brasses of 20% zinc or more blue-black and brown can be produced.

**Moldmakers Supplies:** 205
**Detroit Mold Engineering Co.** — 170 page catalog. A completely revised catalog, with prices, of standard mold bases and moldmakers' supplies. Complete data needed for design of molds and dies is given for every component listed.

**Safety Steel Stamps:** 228
**M. E. Cunningham Co.**, 4-page bulletin. Bulletin No. SS-120 describes the company's line of safety steel stamps, holders, fixtures, and other marking devices. A series of charts of letter sizes is presented to "take the guesswork out of ordering."

## FINISHING

**Small Parts Barrels:** **206**
**Rampe Mfg. Co.** — Details on a small, 9 in. diameter by 3¾ in. deep, closed barrel are available. This is a vinyl lined unit specifically designed for the jewelry trade and the manufacture of small parts.

**Stripper & Cleaner:** **207**
**MacDermid, Inc.** — Two technical data sheets, nos. 46 and 47. Descriptions of two new products, one an immersion strip, requiring no electric current, that will remove most plated coatings. The other product is a new metal cleaner.

**Rust & Scale Removing Compound:** **208**
**Oakite Products, Inc.** — A powdered acid compound that is specifically compounded to remove rust, scale and corrosion products from metal surfaces. It is useful on aluminum, brass and galvanized surfaces.

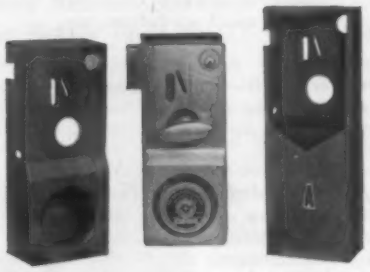
**Automatic Barrel Plating Machine:** **209**
**Hanson-Van Winkle-Munning Co.** — Complete descriptive literature and engineering information on a new automatic barrel plating machine is available. The machine features centralized control to reduce labor costs.

**Blast Cleaning Machines:** **210**
**Wheelabrator Corp.** — Two 12 page catalogs. Complete information on additional sizes of the new Wheelabrator Super Tumblast units. These machines are recommended for blast cleaning of castings, forgings, heat-treated parts, etc.

*Continued on next page*

*For more information circle No. 53 on the Reader Service Card*


**OPC PLASTER**
**These ~~permanent~~ mold castings save time and money**



The Nik-O-Lok Co., Indianapolis, eliminated an entire production operation and cut machining time to a bare minimum by using OPC silicon bronze castings for its lock cases. Formerly, the back plate was a separate piece, (A), welded to the case; OPC produces this four-sided casting in a single piece, ready for final finishing and assembly.

Intricately detailed castings, smoothly finished to the most exacting tolerances, are standard at OPC. Our new brochure will give you plenty of ideas for making notable savings on your small parts—write for your copy today.

OPC **OHIO PRECISION CASTINGS, INC.**
P.O. Box 55-A • • • • DAYTON 3, OHIO
*Plaster Mold Castings made from*
BRASS • BRONZE • ALUMINUM • BERYLLIUM COPPER

**Bata cuts mold cleaning time in half with Pangborn Hydro-Finish**

Bata Shoe Co., Belcamp, Md., used to clean shoe molds by pickling. For a better cleaning job, Bata replaced this process a year ago with Pangborn Hydro-Finish. Today this machine gives Bata top quality cleaning, does the job *in half the time* required by pickling and has required "no maintenance whatsoever." Also, acid disposal problems have been eliminated.

Says Mr. Albert Kotras, Research, "We thought it was sales talk but the Hydro-Finish has lived up to every claim the Pangborn representative made." Convinced by the performance of its Hydro-Finish machine, Bata management now plans to order a second one.

Today, through new design and use of air jet sluriators, Pangborn Hydro-Finish costs less originally, costs less to maintain and gives you easier handling and added efficiency. Write for Bulletin 1403 to PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md.
*Mfrs. of Blast Cleaning and Dust Control Equipment.*

**USE PANGBORN HYDRO-FINISH FOR:**
Deburring • Surface finishing • Finishing threaded sections • Improving cutting tool life • Maintaining dies and molds • Removing grinding lines • Removing heat treat scale • Preparing surfaces for coatings, platings, etc.

**Pangborn**
**BLAST CLEANS CHEAPER**


*For more information circle No. 82 on the Reader Service Card*

**Organic Coatings:** 211
**Red Spot Paint & Varnish Co., Inc.** — A group of file folders containing descriptive material about the many organic finishes this company produces.

**Ultrasonic Cleaning Units:** 212
**Alcar Instruments, Inc.** — File no. 1105, 1 page. A complete description of a small ultrasonic cleaning unit for laboratory or small production use.

**Plating Supplies:** 213
**Udylite Corp.** — Bi-monthly price list published by the company giving current prices for all of the plating supplies and associated materials and equipment handled by them.

**Cutting Electroplating Costs:** 214
**The Diversey Corp.** — 12 page booklet. Nine ways to improve electroplating is the subject of a new, illustrated booklet. Through the use of these recommended practices better plate at lower cost can be secured.

**Spray Painting Machine:** 215
**Conforming Matrix Corp.** — A new automatic pressure contact spray painting machine developed by the company is fully described. The machine is specially designed for the decoration of small parts.

**Screw-Lock Inserts:** 216
**Heli-Coil Corp.** — 8 page specification bulletin. A new bulletin on the complete line of threaded inserts made. Included are data on the new miniature size 4-40 inserts. Selection tables with thread sizes, drilling data, etc. are included.

**Finishing Equipment:** 217
**Clinton Supply Co.** — 4 page bulletin. A listing of plating equipment, barrels and dryers, polishing lathes, and other finishing equipment currently available is given here.

**Spray Booths:** 218
**The DeVilbiss Co.** — 35 page catalog I-7000. Spray booths of every type, size and application are described. Full specifications for each are given. Both standard booths and custom designed units are discussed in this catalog.

**Fastening Devices:** 219
**Shakeproof Div., Illinois Tool Works** — 11 page catalog. A condensed catalog of the different fastening devices made. Design data for each type is included.

**Contact Wheels:** 220
**Chicago Rubber Co., Inc.** — 4 page brochure. A brief description of the R50 solid aluminum hub, rubber contact wheels together with a contact wheel selection and application chart. Prices are given.

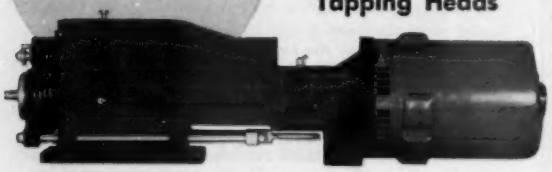
**Abrasive Belt Grinder:** 221
**Grinding & Polishing Machinery Corp.** — Bulletin 110. A description of a new swing frame abrasive belt grinder is given in this bulletin.

**Self-Cleaning Filter:** 222
**Bowser, Inc.** — 4 page bulletin. A report on a new, fully automatic self-cleaning filter for liquids. The unit can be used for lubricating oils and similar liquids or for various coolants. Only a change in filter elements is required to switch from one type of liquid to the other.

**Detergent Cleaning:** 223
**Oakite Products, Inc.** — Application and operating data are available on a new liquid detergent for use in solution lifting steam guns and self generating steam


New Bellows-Locke
Direct Tapping Unit

fast accurate tapping WITHOUT Tapping Heads



This compact versatile unit offers unusual cost-savings in tapping operations.

- Air-Powered Traverse electrically controlled
- Hydraulic Feed Rate Control infinitely variable
- Electrically Rotated Spindle special G. E. Hi-slip Motor
- Full 3" Spindle Traverse

Write for Bulletin DT 50 ADDRESS DEPT. PMM757

1058-A

The Bellows Co.
AKRON 9, OHIO

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CHEMICAL PROCESSING
magnesium?
only TURCO offers you all 3 chemical processes

1 **DESCALING:** Non-electrolytic alkaline process for removing previous chrome pickle films as well as oily substances often found on magnesium.

2 **COATING:** One-package powdered product which, when in solution with water, replaces Dow #17 treatment. Requires no mixing of chemicals. Eliminates chance of human error.

3 **PROTECTION:** Single-package touch-up liquid to produce coatings equal to Dow #18 treatment.

All magnesium processes mentioned above are approved for use by Magnesium Department, Dow Chemical Co.

For cleaning or chemical processing of any metal, turn to Turco . . . *first!*

*Write for* FREE *literature on chemical processing magnesium or any other metal. There is no obligation.*

TURCO PRODUCTS, INC.
Chemical Processing Compounds
6135 So. Central Ave., Los Angeles 1, Calif.
Factories: Newark, Chicago, Houston, Los Angeles, London, Rotterdam, Sydney, Mexico City, Naha (Okinawa)
Manufactured in Canada by B. W. Deane & Co., Montreal
Offices in all Principal Cities

For more information circle No. 83 on the Reader Service Card

cleaning equipment. Called Oakite LSD, the material is reported to do a thorough cleaning job at concentrations as low as 1 to 2 ounces per gallon.

**Faster, Brighter Cadmium Plating:** 224
**Smoothex, Inc.** — Technical data has been published on Cad-Kote, a new cadmium brightener said to give faster plating, increased brightness and longer life.

**Soldering Aluminum:** 225
**Aluminum Co. of America** — Descriptive literature can be secured on a new aluminum solder, no. 805 and a soldering flux no. 66. The solder is reported to join aluminum to its self, to copper, brass, steel, stainless steel, nickel, etc.

**Metal Finishing Chemicals:** 226
**Frederick Gumm Chemical Co.** — 48 page catalog. A description of the various Clepo formulations for cleaning, stripping, deburring, etching, etc.

**Air Motors:** 227
**The Bellows Co.** — 13 page catalog. The use of air motors in original equipment design is thoroughly discussed and many suggestions offered.

**Increased Wear Resistance:** 229
**Chromalloy Corp.**, 4-page technical bulletin. Bulletin No. 2-2 describes the company's patented process for diffusing chromium into medium and high carbon steels to form an extremely hard chromium carbide surface. Dimensional control, surface finish and heat treating procedures are described, and case histories, typical applications, and test results are included.

**Barrel Finishing:** 230
**Minnesota Mining & Mfg. Co.**, 12-page booklet. Twenty-one cost-saving studies of parts that are barrel-finished by the "Honite" method are presented. The booklet is illustrated with before-and-after photos, plus charts indexing types of media, compounds, and their uses.

**Aluminum Anodizing:** 231
**Pyro Metal Finishers, Inc.**, two 4-page bulletins. The company's new semi-automatic method of producing anodized aluminum is described. Photographs illustrate plant facilities and show some of the steps of the process. A second booklet entitled "You Can Get Them All at Pyro" summarizes all the different metal finishing processes handled by the company.

**Clad Metals:** 232
**American Silver Co.**, 4-page technical bulletin. Technical Data Bulletin No. CM-901 is designed to give engineers, designers, and purchasing agents an easy-to-use and reliable reference source for the application and purchase of clad metals, contact materials, and contact assemblies. A chart shows at a glance the major types of clad metals available, their design and engineering functions, and applications.

**Electromagnetic Controls:** 233
**Automatic Switch Co.**, 170-page catalog and technical data book. Catalog No. 57-S gives complete information on the company's full line of electromagnetic controls and solenoid valves. Included are automatic transfer switches, remote control switches, magnetically-held contactors, relays, selonoids, and plant controls. Requests for this catalog should be addressed on company letterhead to Automatic Switch Co., 50-56 Hanover Rd., Florham Park, N. J.


**LIGHTNESS of WEIGHT is ESSENTIAL for PORTABLE TOOLS**

**Many Manufacturers Have Solved Their Needs for Making Tools REALLY Portable by Using Magnesium or Aluminum Die Castings.**

Not only do magnesium and aluminum die castings greatly reduce weight but their toughness and mechanical strength are adequate for the vigorous use to which they are put in such products as portable tools. Furthermore, the great reductions in weight that these lightweight alloys effect reduce working fatigue — thus increasing productivity in the use of these tools.

The photograph illustrates Chain Saw parts die cast from aluminum and magnesium. They are all typical applications and include: 1. and 2. Drive Pulleys, 3. Cylinder Head, 4. and 5. Blower Housing, 6. Handle, 7. Gas Tank Cover. Components such as these have, when die cast, offered greater scope to the designer, and to the manufacturer, important savings through the virtual elimination of machining, finishing and assembling.

**Let's Talk It Over . . .**

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little-jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

*Write today for literature and design information. Quick action on inquiries.*

**LITEMETAL DICAST, Inc.**
A DIVISION OF HAYES INDUSTRIES
1925 WILDWOOD AVE · JACKSON, MICHIGAN
PLANT AND EXECUTIVE OFFICES

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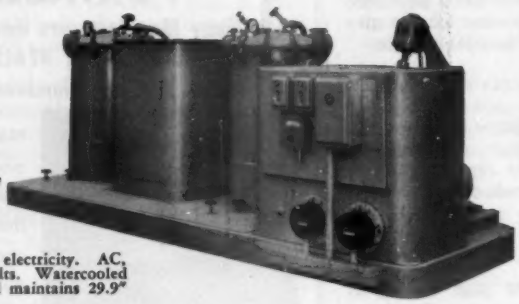
For more information circle No. 79 on the Reader Service Card

# PRODUCTION IMPREGNATION DRASTICALLY CUTS TEST COSTS

with the NEW IMPREX "TWIN 60"



Heated by gas, steam or electricity. AC, DC, 115, 230, 450, 560 volts. Watercooled Vacuum Pump reaches and maintains 29.9" of mercury vacuum.

Production line impregnation of *all* your pressure castings eliminates the costly 100% testing of selective impregnation. Designed for speedy production techniques, the dual autoclave IMPREX "Twin 60" assures complete penetration of sand or die castings of any metal — with coarse or micro-porosity. Advanced engineering of the IMPREX "Twin 60" assures you pressure tight castings, speeds your production, cuts your costs — ***increases your profits.***

*For complete facts and technical data on how* **you** *can do production impregnation write to:*

**IMPREX DIVISION** 2023-e SOUTH 60th • MILWAUKEE 19, WISCONSIN

IDEAL INDUSTRIES, INC., SYCAMORE, ILL.

## M.I.T. COURSE ANNOUNCED FOR INVESTMENT CASTING

Classes in Precision Investment Casting are scheduled at the Massachusetts Institute of Technology, in Cambridge, Mass., for the week of September 8th to 13th. Courses are under the direction of Dr. N. Grant and Professor H. F. Taylor, both of whom have a long association with practical problems of investment casting.

Lectures will cover the subjects of: Investments, properties of refractory materials, expansion, softening, and melting temperatures; Melting, gas, control cost, atmospheres, temperatures, and chemistry; Casting, solidification and heat transfer, hot topping, and gating; Metal Properties, alloy steels, stainless steels, aluminum alloys, and high strength steels; Defects in Casting, porosity gases in metals, cold shuts, and hot tears; New Processes, Glascast, Shaw, Investment, and Parlanti.

Registrations are limited to 60 participants. More information is available at: Summer Session Office, Rm 7-103, Massachusetts Institute Of Technology, Cambridge, Mass.


# A BETTER BACK-UP WHEEL

## R57

## FOR YOUR ABRASIVE BELTS

45° scoop tooth used for aggressive stock removal

**NOW IN POPULAR 14" DIAMETER SIZES AT BIG SAVINGS**

**Now—new production techniques allow you to SAVE on new R-57 Rubber Contact Wheels! They have all the well-known features of R50 and R54 models — longer belt life, oil resistant rubber, wet or dry use, heat dissipation, maximum safety, etc. And what's more, they have a 30% trade-in value! (The R57, R50 and R54 wheels come in many popular sizes, ½" to 22" diameters in 1" to 6" widths, or to your specifications.)**

14"

| TYPE | WIDTH OF FACE 1" | 2" | 3" | 4" |
|---|---|---|---|---|
| 14" PLAIN | 32.00 | 34.00 | 36.00 | 38.00 |
| SERRATED | 37.00 | 39.00 | 42.00 | 44.00 |

IN PLAIN OR SERRATED FACE IN ALL DUROMETERS

DElta 6-8900

**A WHEEL FOR EVERY OPERATION**

**45° Standard** Stock Removal
**Slit Serration** Aggressive Contact Work
**"X" Serration** Moderate Contour Work
**Cosmo Expander** Operates Without Backstand Idler

CHICAGO RUBBER COMPANY, INC.
651 MARKET STREET • WAUKEGAN, ILLINOIS

For more information, circle No. 77 on the Reader Service Card

Chatterless!

use NOBURSINK for . . Unequalled Performance

in
• Deburring
• Chamfering

A NOBUR TOOLS

NOBUR MANUFACTURING CO.

6860 Farmdale, North Hollywood, Calif.

Circle No. 80 on the Reader Service Card

## SMALL PARTS

*continued from page 43*

neers is the lens iris ring seen at lower left. It is made of powdered bronze. If the part were machined a lot of intricate tooling and several machine tool operations would be needed.

The lens iris ring is used in the 16 millimeter electric eye camera. The leaves which open and close to control the amount of light admitted into the camera, are attached to the ring in assembly.

There are many other uses made of sintered metal parts in the production of the entire line of cameras, movie and still projectors, and microfilm equipment manufactured by this company. Both ferrous and non-ferrous parts are used. Non-ferrous parts are made of bronze, an alloy of copper and tin. Ferrous pieces are composed of an alloy of iron and graphite. These pieces are produced to closely-held tolerances, some as low as .0005".

## CLEARING NAMES TUGLUS ASSISTANT SALES HEAD

Newly named to the post of Assistant Sales Manager of the Clearing Machine Corporation, Lou Tuglus is a 17-year veteran of the Chicago, Ill., company.

Lou Tuglus

Other news from Clearing, a division of U.S. Industries, Inc., reveals that a new office is being established in Toledo, Ohio. The new address is Room 222, Fine Bldg., 1513 Jefferson St., Toledo.

*For more information circle No. 89 on the Reader Service Card*

**get the new booklet on BARREL FINISHING**

Abbott's new booklet gives the latest information on barrel finishing by the Abbott Method. It describes equipment and materials and how to use them. *The abbot* introduces to barrel finishers the new Abbott Welded Steel Barrel—now available for the first time. The booklet, "*The Abbott Method of Barrel Finishing,*" is a must for methods engineers and production men everywhere.

"Send for your copy today"

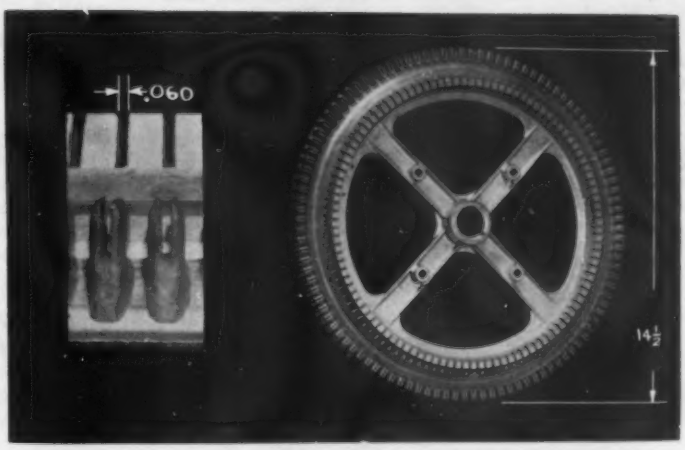
the abbot

**THE ABBOTT BALL COMPANY**

*Producing carbon steel bearing balls since 1910*

**1084 New Britain Avenue, Hartford 10, Connecticut**

ABBOTT




**With "IMPACT INJECTION" of aluminum the 216 small slots and raised lips are filled out in detail. The section view of the casting is to scale.**

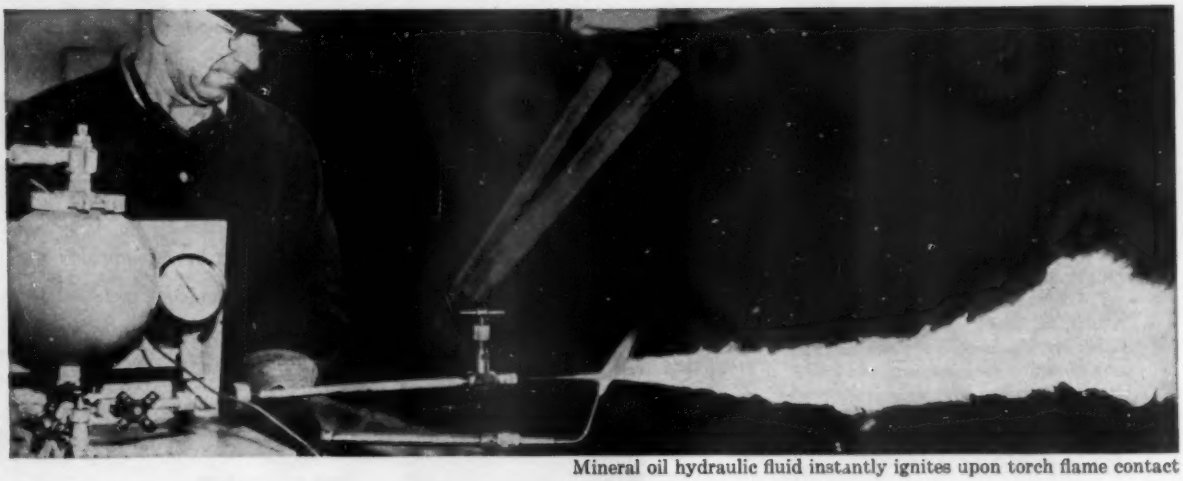
Federal

**DIE CASTING COMPANY**

2220 NO. ELSTON AVE. CHICAGO 14, ILL.

Phone AR-6-4803

*For more information circle No. 28 on the Reader Service Card*



Mineral oil hydraulic fluid instantly ignites upon torch flame contact

# Fire resistance plus low cost

FOR MANY YEARS frequent industrial fires involving hydraulic fluids have taken their toll in man-hours and high costs. This has created a widespread need for a relatively inexpensive all-purpose, fire-resistant hydraulic fluid.

In undertaking this challenge, Shell Research Laboratories spent over four years in laboratory and field testing before a solution was reached. The result was the introduction of Irus* Fluid 902 . . . the first low-cost, oil-base fluid that, under plant conditions, actually snuffs out fire.

The new formulation is a specific combination of petroleum oils mixed with water and emulsifying agents. It gains its fire resistance through a relatively high water content. Irus Fluid is perfectly adapted to the majority of hydraulic systems. The following is typical of many reports in Shell files.

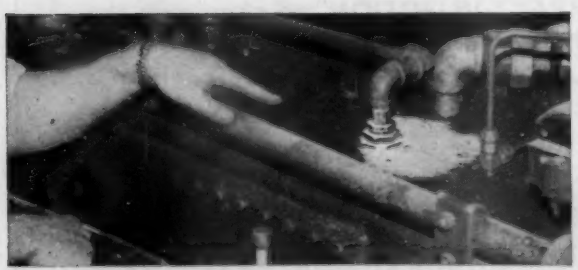
### Typical Problem and Solution

The welding plant of a prominent automotive manufacturer employing 100 hydraulically operated electric welders formerly used a straight mineral oil fluid. On one occasion, damaged fluid lines allowed this mineral oil under high pressure to spray directly onto the welding area. Sparks ignited the fluid . . . caused an immediate flash fire which resulted in 75% machinery damage before it was extinguished. Immediately following this incident, the changeover was made to Shell Irus Fluid 902. Shortly thereafter a line broke and the high-pressure spray once more contacted welding sparks. There was no fire at all . . . and in a matter of minutes the machinery was operating at full efficiency.

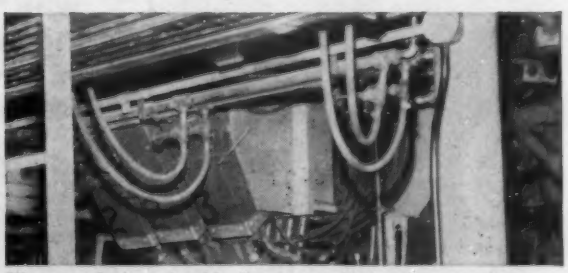
The two photos above provide dramatic proof of its flame resistance. In the photo on the left, conventional hydraulic fluid instantly ignites upon contact with an oxy-acetylene torch flame, whereas Shell Irus Fluid 902 (right photo), under the same conditions, does not support combustion beyond an inch or two from the flame. *Under plant conditions, it actually snuffs out fire!*

### Two-Way Economy

An advantage not to be overlooked is the low cost of Irus Fluid 902. Many plant operators now making the



A leak is quickly spotted because of Irus Fluid's distinctive yellow color.



The complexity of cable lines necessitates the use of a fire-resistant hydraulic fluid to eliminate fire hazard.

Under the same conditions, Shell Irus Fluid 902 clearly demonstrates its fire resistance

# in a new hydraulic fluid

switch to Irus Fluid find that it costs up to one-third less than other fire-resistant fluids—and its performance is comparable in every practical respect. This money-saving advantage is a vital consideration not only in the initial purchase price, but in reducing make-up loss expense.

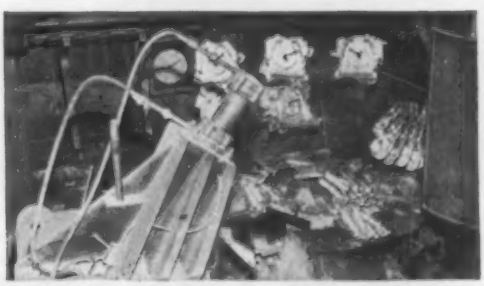
**Irus Fluid 902 has other features, too:**

1. **It contains no corrosive ingredients and has shown no harmful effects on normal seals, fittings, or bearings . . . it will not promote rust.**
2. **No major equipment modification is necessary . . . simply clean your present fluid thoroughly from the system and replace with Irus Fluid.**
3. **Practical application proves it has exceptional viscosity and lubricating qualities . . . doesn't thin out in use.**
4. **The yellow color of Irus Fluid enables you to spot and trace leaks easily . . . a valuable benefit in preventive maintenance.**

If your operation utilizes die-casting machines, plastic molding machines, glass blowing machines, permanent mold machines or any other hydraulic equipment where fire hazards are of concern, we suggest you investigate the advantages of Shell Irus Fluid 902.

Write or call the Shell Oil Company office nearest you.

*Trademark



Such specialized die-casting machines require a fire-resistant hydraulic fluid to assure maximum safety.

Finger points to line break in hydraulic cable that caused flash fire and machinery damage while operating with mineral oil type fluid.

**SHELL OIL COMPANY**

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

# NEW PRODUCTS AND DEVELOPMENTS

*Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 48 of this issue*

## NEW RUBBER CONTACT WHEEL SHOWS GREATLY INCREASED ABRASIVE BELT LIFE

A new rubber contact wheel which has increased abrasive belt life as much as 40 percent has been developed for use on backstand grinding and polishing operations.

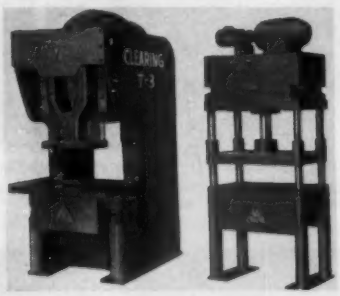
Made with a slashed serration, the "X" wheel is formed from a new type of neoprene that is substantially more abrasive resistant than rubber compounds previously used, according to Minnesota Mining & Mfg. Co. who make the new wheel. An improved type of flange construction eliminates the possibility of damaging the flange as it is an integral part of the wheel, and is permanently attached to the hub.

Because of the new type of serration, the wheel has wider-than-usual lands providing more rubber surface for longer wear, but with no sacrifice of conformability or aggressiveness. The wheel has, in fact, more conformability than wheels with standard serrations, and leaves no mark on the work piece.

The new contact wheel is finding wide application in off-hand grinding and polishing of gates and parting lines, snagging and finishing on metal parts. It is available in a 14 in. diameter with 1, 2, 3 and 4 in. face widths and in several different hardnesses.

Circle No. 240 on Reader Service Card

## LOW COST HYDRAULIC OR MECHANICAL TRIMMING PRESSES INTRODUCED

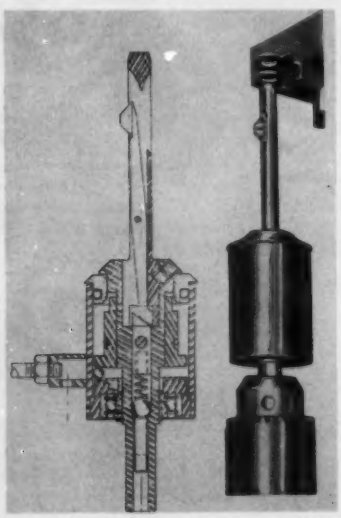



An all new, low cost line of trimming presses has recently been introduced by one of the old, established press manufacturing concerns. These presses have been designed specifically for use in removing the flash from die castings and feature wide bed area with low tonnage and convenient bed openings for disposal of scrap. They are available in either mechanically or hydraulically operated models.

Before the introduction of this line of presses by Clearing Machine Corp. die casters often found it necessary to purchase much greater tonnage, standard production presses in order to get the table area needed and the required openings to provide adequate room for scrap removal. These presses have been engineered to be strictly functional and for a specific job.

Circle No. 239 on Reader Service Card

## AUTOMATICALLY ACTUATED DEBURRING TOOL OPERATES FROM ONLY ONE SIDE



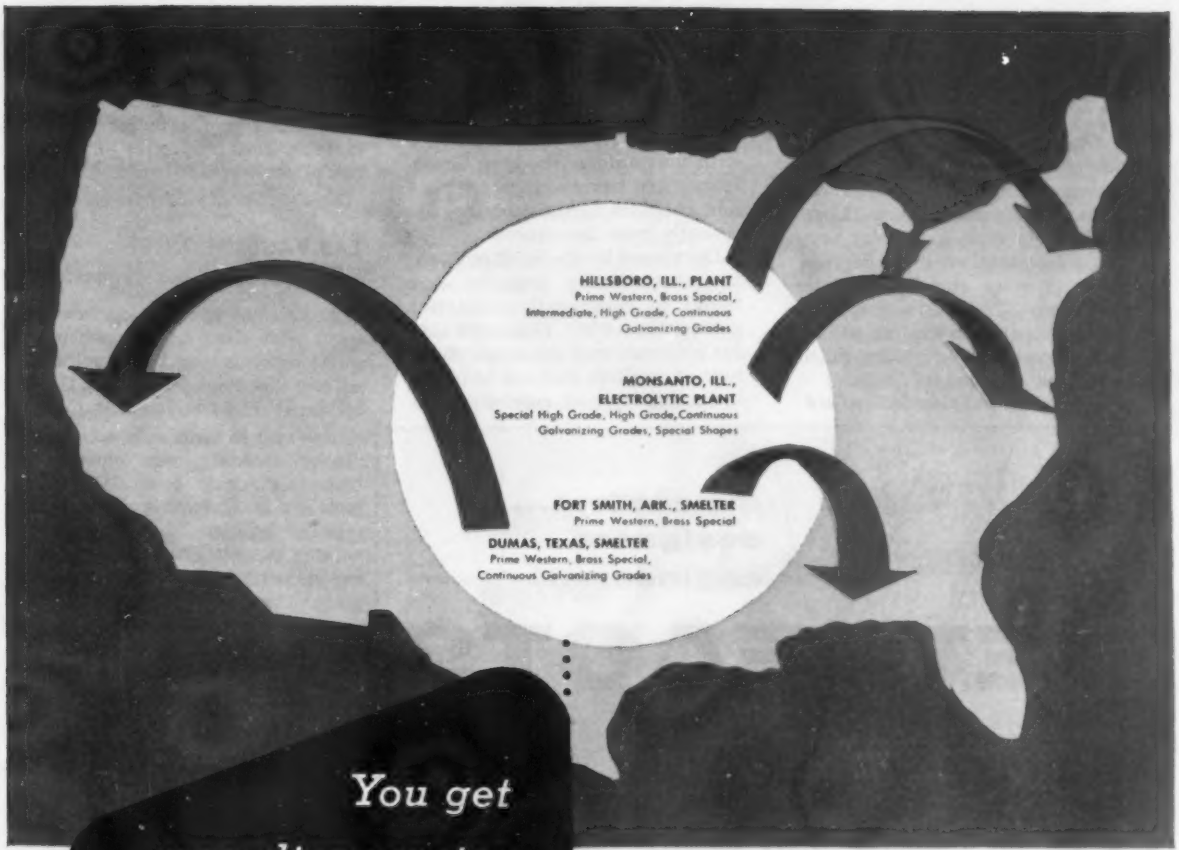
A new deburring tool has been introduced that is said to meet the demands of industry for a tool which would function with a positive mechanical action, and at the same time be automatically self-actuated. This type of tool represents another step towards greater automation.

Developed by Nobur Mfg. Co. it is said to be an ideal tool for deburring and chamfering both front and back sides of holes where manufacturing procedure is facilitated by a tool which will finish both faces from but a single entry without need for reversing the part. It will also operate in blind cavities where the back face is not openly exposed and in line drilled holes through two or more parallel walls.

The tool is a rugged, positive action, automatic self actuating unit that does not depend on any spring setting. It thus assures a tool of consistent, dependable and matched performance useful where large volumes of work must be done.

While the new deburring tool is designed specifically for use in mechanized or automated machine tools, it is equally adaptable to manual usage in conventional drill presses and in sequence drilling operations.

Circle No. 241 on Reader Service Card


HILLSBORO, ILL., PLANT
Prime Western, Brass Special, Intermediate, High Grade, Continuous Galvanizing Grades
MONSANTO, ILL., ELECTROLYTIC PLANT
Special High Grade, High Grade, Continuous Galvanizing Grades, Special Shapes
FORT SMITH, ARK., SMELTER
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*Distributors for* AMERICAN ZINC, LEAD & SMELTING COMPANY

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***For more information circle No. 7 on the Reader Service Card***

### ZINC, CAD BRIGHTENER
### . . . gives low cost treatment

Four new dilute dips for zinc die castings, zinc and cadmium plated surfaces have been announced by Metal & Thermit Corp.

The new dips operate at very low concentrations and offer low make-up costs and low maintenance cost. Zinc surfaces treated in the proper bath assures an economical corrosion resisting finish with high sales appeal.

Circle No. 260 on Reader Service Card

### NEW RHODIUM PLATES
### . . . have twice usual thickness

Rhodium electroplates of at least twice the thickness possible with conventional rhodium formulations are being obtained with a new rhodium formulation that has recently been announced.

Developed by the Sel-Rex Corp., the extra heavy deposits were found to consistently measure greater than 0.001. Test work thus far indicates that the actual thickness of rhodium that can be plated is limited by cost considerations.

The extra heavy deposits that feature this process promise to be of considerable importance where high resistance to wear is required in addition to the better known metallurgical properties of rhodium plate.

Circle No. 243 on Reader Service Card

### LAB VACUUM UNIT
### . . . for coating and degassing[1]

A vacuum system for laboratory, pilot plant and limited production use is now being marketed by the Rochester Div., Consolidated Electrodynamics Corp.

The unit is built as a complete system needing only electrical, water and drain connections for installation. The work chamber is a pyrex bell jar, 14 x 24 in. seated on a baseplate which has holes for the pressure sensing elements, filament heating electrodes, and accessories.

Ultimate pressure, without a nitrogen trap, is $2 \times 10^{-5}$ mm Hg. with a liquid nitrogen trap the ultimate pressure is $2 \times 10^{-6}$ mm Hg. Pump down time with a clean dry system is six minutes to a pressure of 0.5 micron Hg.

Circle No. 258 on Reader Service Card

### NEW MAGNESIUM FINISHES
### . . . for better corrosion resistance

Two new finishing processes have been developed that are reported to give better corrosion and abrasion resistance and superior paint bonding than has been available.

The new processes, released by Turco Products, Inc., are designed to eliminate the need for precise measuring and mixing of several chemicals and to overcome the resultant inconvenience and chance for error. They do not require complicated control procedures.

Turcoat 4245-2F is a production-line process. A dry powder is mixed with water to prepare the bath. Either direct or alternating current may be used. Hexavalent chromium is the only control that is required and the bath is brought back to required strength by the addition of original material, or water.

Turcoat 4091 is a process liquid, used as received, designed for touch-up work on coated magnesium that has been scratched or abraded. It is also recommended for coating work that is too large

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designers...
engineers...
GET the FACTS
on how
HENNING
ALLOYS
can help you get
better results
at lower cost
Get Henning's informative Reference Book on Zamak (zinc base) die casting alloys and find out how you can get more efficient results when you specify the Zamak alloy that meets your precise needs — and at lower cost.
Die casters will find specific details on those requirements of alloys which affect the properties, both mechanical and physical, of the casting produced.
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"Dependable service since 1922"
Smelters & Refiners of • Aluminum • Bronze • Brass • Zinc • Lead
All Ingot produced under laboratory control


For more information circle No. 36 on the Reader Service Card

for immersion in tanks. No current is needed, the liquid is simply brushed or sprayed onto the metal surface to be protected. This compound is also recommended for use in a dip tank to replace chrome pickle.

Circle No. 257 on Reader Service Card

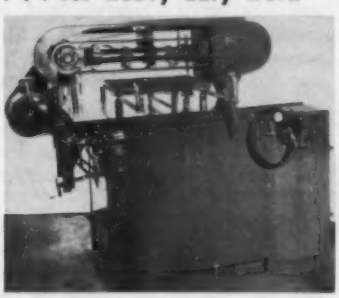
### NEW STRIPPING AGENT
### . . . for epon coatings

A new stripper, S-A, has been announced by Oakite Products, Inc. that is reported to be able to remove epon and other tough coatings.

The material is a solvent-acid compound, inhibited for safety on all metals except magnesium during the recommended stripping period. S-A is reported to remove many finishes impervious to other strippers in just 10 minutes, and to remove a wide variety of resistant paints in from 1 to 5 minutes. It will also remove light rust, scale and smut deposits. Used at room temperature and at full strength, the parts are immersed in the stripping agent for the necessary time, then rinsed with cold or hot water. There is no fire hazard from this material.

Circle No. 253 on Reader Service Card

### HORIZONTAL SANDER
### . . . for heavy duty work



A new model, H.S.696, flat grinder is the latest addition to the line of abrasive belt machines manufactured by the Bush Mfg. Co. This machine was designed for use in shell mold stack grinding, but is suitable for many high production, heavy service flat grinding operations.

The machine is completely air controlled with an automatic tension arm that carries a 6 in. wide belt, 96 to 106 in. long. The stock feed platform is also air controlled and either hand or conveyor fed. The platen is 6 in. wide and has replaceable wear inserts.

Circle No. 251 on Reader Service Card

### TABLE TONGUE SANDER
### . . . uses 90-inch belt

Among the outstanding features of a table tongue sander is a work table which tilts 45 degrees either front or rear for predetermined angular grinding or deburring.

The grinding belt head offers a six-inch vertical adjustment, using a 90-inch abrasive belt ranging from one quarter to two inches wide. Twenty-six contact wheels in a wide range of sizes have been developed for the machine, according to the Bush Mfg. Co.

Circle No. 260 on Reader Service Card

### SURFACE PYROMETER
### . . . in three sizes

A low-cost surface pyrometer for the instantaneous taking of temperatures of all types of surfaces will check surfaces as small as one quarter inch with an order of accuracy of two percent over the entire scale, Pacific Transducer Corp. reports.

The portable instrument, weighing 1½ pounds, is balanced for hand use and is chrome plated throughout. The thermocouple, 12 inches long, is insulated.

Circle No. 306 on Reader Service Card

*Continued on next page*

**are reasons why SCOTT-ATWATER uses ACCURATE die castings**

■ Because of their uniformity and light weight, ACCURATE die castings greatly reduced the time required for handling and assembly. Cast to close tolerances, they reduced or eliminated machining operations, special tooling and scrap loss. In addition, a more dependable and efficient motor was produced with die castings that have high strength-light weight properties and are non-porous and leakproof. Perhaps you too, can improve your product and profit picture with ACCURATE die castings. Write, wire or phone if you have a parts problem demanding immediate attention.

ALUMINUM • ZINC • MAGNESIUM DIE CASTINGS

**ACCURATE DIE CASTING CO.**

3089 E. 80th STREET • CLEVELAND 4, OHIO

*For more information circle No. 2 on the Reader Service Card*

### PREHARDENED DIE STEEL
**. . . for use in die casting dies**

Announcement has been made by the Latrobe Steel Co. that their Viscount 44 die casting die steel is now available prehardened to 42 to 46 Rockwell C. Prehardening gives the steel a marked advantage when used for die casting dies since heat treatment after machining is eliminated, thus avoiding possible dimensional changes and distortion.

Even though fully hardened, machinability of the steel is good due to the uniform dispersion of sulfide particles.

The steel is a chromium-vanadium type with good resistance to wash and heat check so that die life at elevated casting temperatures is excellent. It is recommended for both zinc and aluminum casting dies.

Circle No. 259 on Reader Service Card

### FOUR NEW FINISHES
**. . . for zinc and aluminum**

Four new products have been added to the Iridite line of conversion coating chemicals by Allied Research Products, Inc.

Iridite No. 5-P produces a yellow iridescent coating on zinc and cadmium plate, galvanized iron and zinc die castings. This finish is highly corrosion resistant and a good paint base.

Iridite No. 8-4 is an all purpose chromate for all forms of zinc and cadmium. It provides a bright finish at economical cost, or can provide a highly protective coating on zinc base die castings, zinc plate, cadmium plate and galvanized steel.

Iridite No. 12-P is designed to give a clear, blue-bright finish with extreme economy and simplicity of operation in a one dip operation on zinc-plated parts.

Iridite No. 14-9 provides, in a one dip treatment, a clear protective coating for aluminum surfaces. It provides excellent corrosion protection even for marine applications.

Circle No. 252 on Reader Service Card


**reasons why you can rely on**

*die castings from Pressure*

- ENGINEERING "KNOW HOW"
- SKILLED TOOL AND DIE MAKING
- MODERN DIE CASTING EQUIPMENT
- RIGID POINT-BY-POINT INSPECTION
- CERTIFIED ZINC AND ALUMINUM ALLOYS

The result is die castings of utmost quality and precision . . . delivered "on time" and in exact accordance with your specifications. Next time make sure you order "die castings from Pressure."

**PRESSURE CASTINGS, INC.**

*ZINC AND ALUMINUM DIE CASTINGS*

21500 St. Clair Avenue • Cleveland 19, Ohio


### TEMPERATURE CONTROL UNIT
**. . . is immune to corrosion**

Designed particularly for use under corrosive conditions such as found in cleaning and plating installations, a new temperature control unit made by Carl Buck & Associates is now available.

A special temperature sensing unit has been devised that is fastened onto the outside of either delivery or discharge pipes on tanks and heat exchangers. The assembly is then covered with insulation. With this arrangement satisfactory temperature control is easily secured without having the sensing element immersed in corrosive liquids and without impeding fluid flow.

Any equipment which can be electrically operated, such as solenoid valves, magnetic contractors, etc. can be controlled by the new unit which gives only simple off-on operation.

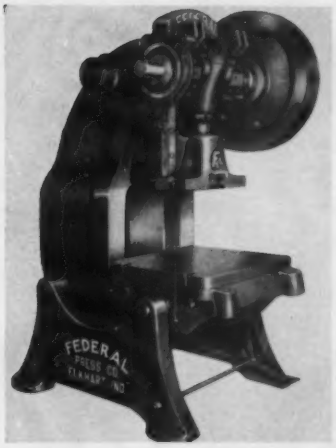
Circle No. 256 on Reader Service Card

### LARGE CAPACITY PRESS
**. . . for trimming die castings**

A new, large capacity press, model 55, has been added to its line of standard presses by the Federal Press Co. The new unit, designed for trimming die castings and similar operations, is a 56 ton capacity model.

The new "55" has been designed with extra generous dimensions to handle the large dies characteristic of die casting trimming.

*For more information circle No. 56 on the Reader Service Card*




The press has a standard stroke of 4 in. with up to 12 in. available at extra cost. Other standard dimensions are: ram area 11¼ x 24 in.; shut height 12¼ in.; bed to slide, stroke down adjustment 15 in.; throat depth 15 in.; back opening 22 in.; bolster plate 36 x 28 in. Variations of the standard dimensions are available at extra cost if desired.

The "55" is available as either flywheel or geared type, in mechanical or air clutch models.

Circle No. 250 on Reader Service Card

### *BLASTING MACHINE . . . for organic media*

A fully conveyorized automatic metal finishing machine designed to use organic media such as nut shells, rice hulls, etc. has been introduced by the Cro-Plate Co. The machine will clean and deburr without stock removal or discoloration of the work.

In the machine illustrated the aluminum transmission components from which burrs are to be removed are manually loaded at the left. In sequence they are indexed through a compressed air blow-off cabinet for removal of moisture; the blast cabinet where the work holding fixtures are rotated under the blast guns; a secondary blow-off cabinet where any residual abrasive grain is removed, then to a selective unloading device.

Circle No. 249 on Reader Service Card

*Continued on next page*

UCON Hydrolubes
spell
SAFETY
This new booklet . . .
. . . tells you how CARBIDE's UCON Brand hydrolubes spell safety for you, your plant, and your employees.
Yes, industrial experience over a period of more than 10 years has shown that the common fire hazards connected with hydraulic operations are eliminated when UCON hydrolubes are used. So, why not find out how the fire-resistance, outstanding anti-wear characteristics, and corrosion protection of new and improved UCON hydrolube "CP"-type fluids can help spell safety for you. Write for "Ucon Hydrolubes Spell Safety," Form 40134.
CARBIDE
CARBIDE AND CARBON CHEMICALS COMPANY

*For more information circle No. 72 on the Reader Service Card*

### *METAL POWDER PRESS . . . for small parts*

The model F-4, 4 ton single punch powder metal press built by the F. J. Stokes Corp., is a highly accurate compacting machine, well suited to the production of small pieces of high density. It compresses from above and below, and can make parts up to 1¼ in. in diameter and 1¼ in. depth of fill at the rate of from 34 to 50 pieces per minute. Dust tight for the protection of the working parts from abrasion, and with smooth lines for easy cleaning, it has adjustable V-gibs and a guided lower plunger.

Circle No. 254 on Reader Service Card

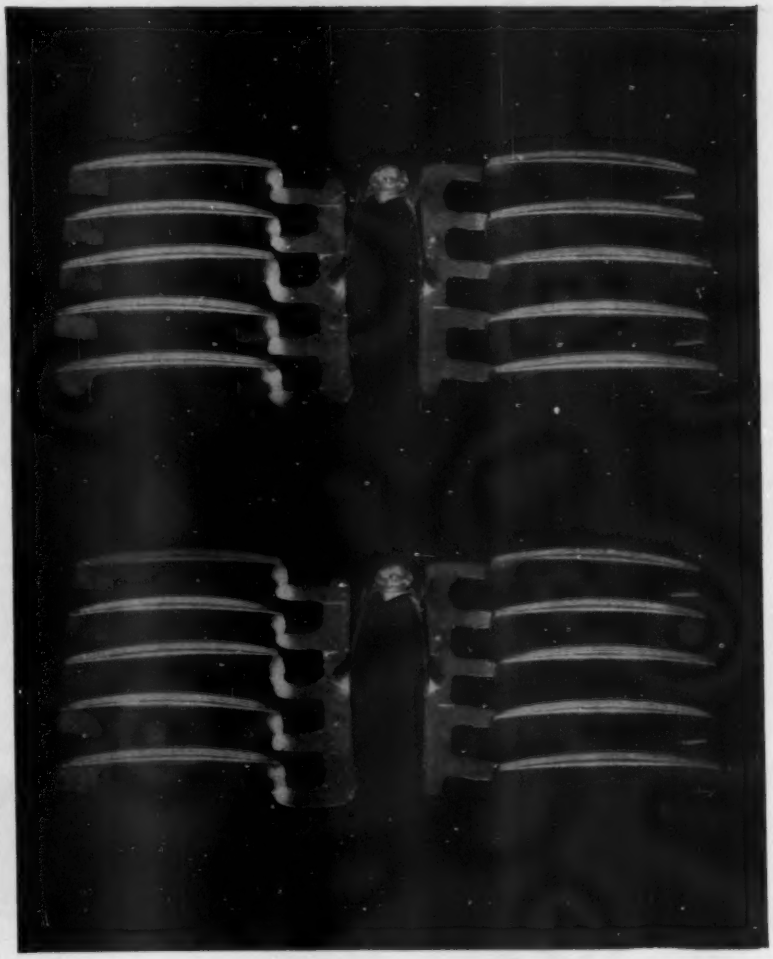
### *NEW BRASS TREATMENT . . . passifies and protects*

Brasslyfe, a process that pacifies and protects brass in one application has been introduced by Logo, Inc. An air dry spray material it is claimed to pacify brass and prevent tarnishing and finger stains from appearing after the parts have been shipped.

Brasslyfe is also claimed to be a hard, tough, durable coating that shows excellent weather and humidity resistance. It can be sprayed, dipped or brushed and while chemical reactions continue for several days, parts can be packaged an hour after application.

Previously, finger stains and airborne contaminants have often shown up after a protective lacquer coating has been applied to the brass. In some cases, brass has to be coated and baked to secure a tough, durable coating. The new material is said to combine these two processes into one without requiring a baking system.

Circle No. 246 on Reader Service Card

**FEDERATED ALLOYS**
**FOR THE DIE CASTING INDUSTRY**

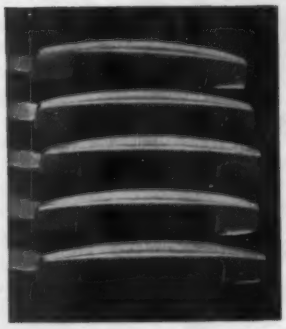
**DI-METAL . . .**
a zinc base alloy of high purity, produced in three grades to meet all required mechanical properties.

**ALUMINUM ALLOYS . . .**
produced by Federated to conform to the ASTM, SAE, AMS, USN, Federal and AMS specifications.

Federated has 12 plants and 22 conveniently located sales offices which can give you expert assistance in choosing and applying a die-casting alloy; and which assure you of prompt delivery when you require it.

*Federated* products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust



# Skill makes them look good! Good metal makes them STAY GOOD!

Even if the alloy you buy casts correctly, brings out fine detail and takes a good finish, you may not be getting the consistent quality you think you are.

Minor variations in certain ingredients can change the characteristics of any alloy. If your die casting is a working part this can be critical. Toughness or strength may not reach the limits you designed for. The safety factor you expected may be missing.

Many people buy Federated die casting alloys because they know every heat is spectrographically and chemically tested to make sure chemical and performance specifications are met exactly. This constant quality check is conducted under rigid procedures developed by ASARCO's Central Research Laboratory, where metal impurities can be controlled to parts per million.

Don't believe loose quality-control claims. Check on them. Your Federated representative will be pleased to tell you why we give you a top-quality product, identical in characteristics, every time you buy from us.

Federated Metals ASARCO

Division of

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120 Broadway • New York 5, N.Y.

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*For more information circle No. 29 on the Reader Service Card*

### NEW STRIPPING AGENT

**. . . 2 to 3 times faster than alkali**

By reducing immersion times and subsequent stripping operation man-hours, a new fast acting, tank type accelerated alkaline paint remover, developed by Wagner Bros., Inc., drops costs of production stripping operations as much as 10 percent.

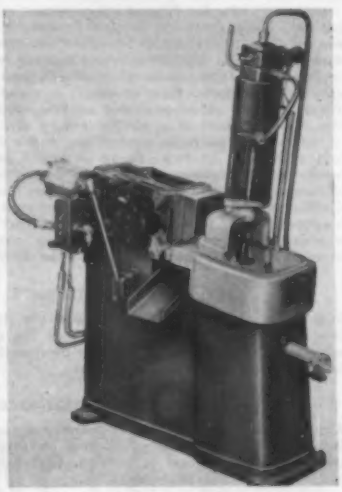
Almost 2 to 3 times faster acting than ordinary caustic soda type removers, it can be used to strip ferrous metals of practically all paints, including lacquers and enamels.

The new stripper includes accelerators which destroy paint bonds, combined with wetting and penetrating agents to provide effective subsequent cleaning.

Circle No. 248 on Reader Service Card

### DIE CASTING MACHINE

**. . . for high speed production**

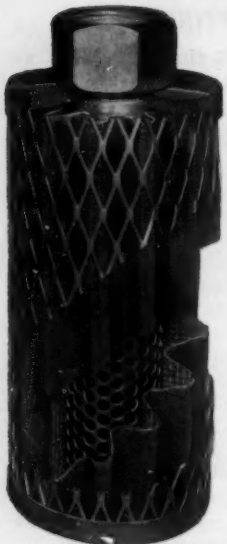


An advanced version of the DCMT IMP/96 high speed die casting machine has been announced. The new machine is specifically designed for continuous operation under the most arduous industrial conditions according to British Machines and Foundry Supplies, Ltd. who handle the machine in this country.

The new unit has a maximum shot capacity of 1 lb. of zinc and it has a very high free cycling speed. The machine is designed in units that are easily removed so that down time for maintenance on the machine or dies is a minimum. With this design, die change-over is very rapid.

Circle No. 255 on Reader Service Card

*Continued on next page*



SUMP TYPE (cutaway)

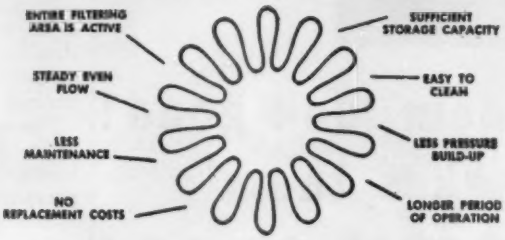
## When You Need A Filter — Get The Advantages of

# MARVEL'S

## SYNCLINAL DESIGN

## It's Balanced For Top Performance!

## Look For These Important Features




**For All Hydraulic and Other Low Pressure Liquid Systems**

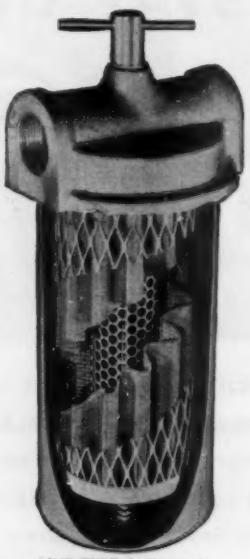
**In the selection of a filter to obtain maximum efficiency and quality, the most important point to consider is a specific type filter that will offer greatest ACTIVE filtering area with ample storage capacity for filtered out particles, rather than total filtering area alone. Over 750 Original Equipment Manufacturers install Marvel Synclinal Filters as Standard Equipment because they are designed to give this all-important balance for greatest efficiency in filtration of liquids in all hydraulic and other low pressure circulating systems. Flow of liquids is maintained at a constant, steady rate of speed produced by the pump which brings about the desired effect of a gentle, evenly distributed accumulation of filtered out particles against the entire filtering surface with less restriction of flow. Result — longer periods of productive operation at minimum maintenance down-time. If this important balance is lacking due to efforts to cram too much filtering mesh for the sake of total rather than active area, filters soon become clogged causing pressure build-up, turbulent flow and in general decreases the efficiency of operating equipment. Depend on Marvel Synclinal Filters For All Your Filtration Requirements.**

**EASY MAINTENANCE**

**Both sump and line types may be easily disassembled, cleaned and reassembled by any workman, on the spot, in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connection.**

**A SIZE FOR EVERY NEED**

**Available for sump or line installation in capacities from 5 to 100 G.P.M. Greater capacities may be attained by multiple installation as described in catalog. Choice of Monel mesh sizes range from coarse 30 to fine 200.**



LINE TYPE (cutaway)

**WATER FILTERS**

**Both sump and line type filters have been adapted for use in all water filtering applications. No changes have been made in the basic, balanced synclinal design.**

**FILTERS FOR FIRE-RESISTANT HYDRAULIC FLUIDS**

**Marvels most recent development is a filter for the efficient filtration of all types of fire-resistant hydraulic fluids.**

**Catalogs containing complete data available on request**

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**As in the past, Marvel continues to offer IMMEDIATE DELIVERY.**

**MARVEL ENGINEERING COMPANY**
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Without obligation, please send me complete data on Marvel Synclinal Filters, as indicated—

- ☐ Catalog #100—For Hydraulic Oils, Coolants, Lubricants.
- ☐ Catalog #200—For Fire-resistant Hydraulic Fluids (Aqueous Base)
- ☐ Catalog #400—For Fire-resistant Hydraulic Fluids (Synthetic)
- ☐ Catalog #301—For Water

Name.....

Company.....

Address.....

City.....

State.....


### *ULTRASONIC DEGREASER . . . for small scale operations*

A compact, small-scaled duplicate of a large ultrasonic degreaser has recently been announced. Engineered as exactingly as its larger counterpart, the new degreaser is a bench model specifically designed for laboratory use and small production requirements.

It cleans thoroughly such parts as small castings, watch and instrument parts, tools and dies, valve components, etc. The work space is 9″ x 9″ x 6″ high with a capacity of 100 lbs. per hour of steel parts as a minimum. The overall dimensions are 33″ x 15″ x 24″ high and the weight only 75 lbs.

Developed by the Ramco Equipment Corp., the cleaner is equipped with a thermostatic control, filter, manual spray, copper cooling coils, stainless heater and a solvent recovery system.

Circle No. 242 on Reader Service Card

### *NEW, VERSATILE SWITCHES . . . for pyrometry circuits*

An all new, expanded line of key-type selector switches for pyrometry circuits has been introduced. These switches provide users with a much more versatile means of connecting sensing elements to indicators, recorders or other instruments.

Two-position key switches — four pole, double throw type — permit the optional connection of a number of sensing elements to either of two instruments according to Thermo Electric Co., Inc., the manufacturers.

Two-position key switches — double pole, single throw type — permit rapid checking of temperatures from many points or averaging temperatures from a number of sensing elements.

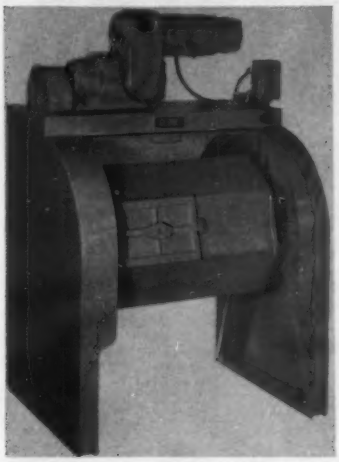
Circle No. 245 on Reader Service Card

### *NEW FINISHING BARREL . . . for small to medium runs*

A new finishing barrel has been introduced, designed specifically for small to medium sized production runs. It is able to finish metal, plastic and rubber parts at a material saving in time and money.

Designed and built by Casalbi Co., the new barrel affords the

advantage of doing up to four operations at one time in individual compartments for such processes as deburring, grinding, polishing, burnishing and deflashing.

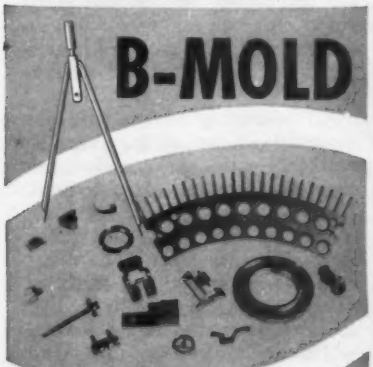


The new barrel features a free swinging safety screen, light weight aluminum door and latch, ¼ in. abrasive-resistant bonded neoprene lining, manually operated reversing switch and many others.

Circle No. 244 on Reader Service Card

*Continued on next page*


**B-MOLD**



**PRECISION FERROUS AND NON-FERROUS CASTINGS**

- investment (lost wax)
- permanent mold
- centrifugal

Consult our Engineering Department, without obligation.

**B-MOLD DIVISION**
Buckeye Brass & Mfg. Co.
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Circle No. 68 on the Reader Service Card



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We can reduce your costs and improve your product with the advantages of the powdered metal process. Our modern plant and technical facilities are at your disposal to meet your most exacting parts requirements. Your inquiry is solicited for study and quotation.

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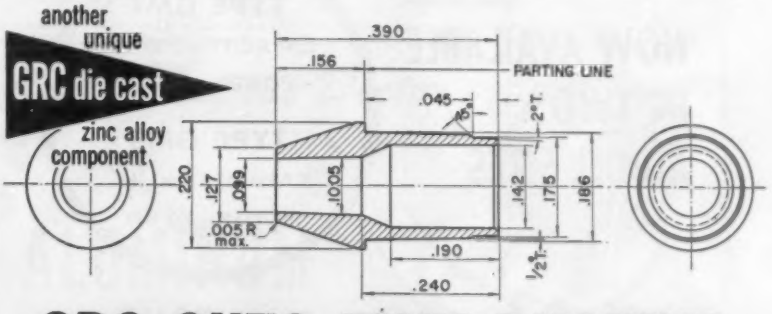
REESE METAL PRODUCTS CORPORATION
537 Howard Ave., Lancaster 10, Pa.

**TYPICAL PARTS:**
Gears, pinions, cams, ratchets, bearings and bushings, machine and structural parts.

SPECIAL, high speed rotary presses available for high quantity, small part production



another unique **GRC die cast** zinc alloy component




# GRC CUTS TINY BUSHING COST TO $2.00/M

Die cast by GRC in zinc alloy in a single automatic operation, this former screw machine part for a ball point pen, now costs little more than $2.00 per thousand in lots of a million.

Each bushing is uniform, clean and accurate — no cut-off marks, no burrs, no secondary trimming and no scrap loss. Typical of the production economies and wide design latitude which GRC's exclusive patented methods have made possible on parts "no bigger than your thumbnail"! (Maximum size is 1¾" long, ½ oz.; no size too small).

Simple or complex, let GRC's unique techniques go to work for you . . . on tiny die cast *and plastic molded* parts made to order . . . on their wide variety of standard parts available in stock — wing and round head thumb nuts and screws, cap nuts, rivets, gears and pinions — you'll be glad you did.

*Write, wire, phone TODAY for bulletins, spec sheets and prices. Send prints or specs for quotation.*

GRIES

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World's Foremost Producer of Small Die Castings
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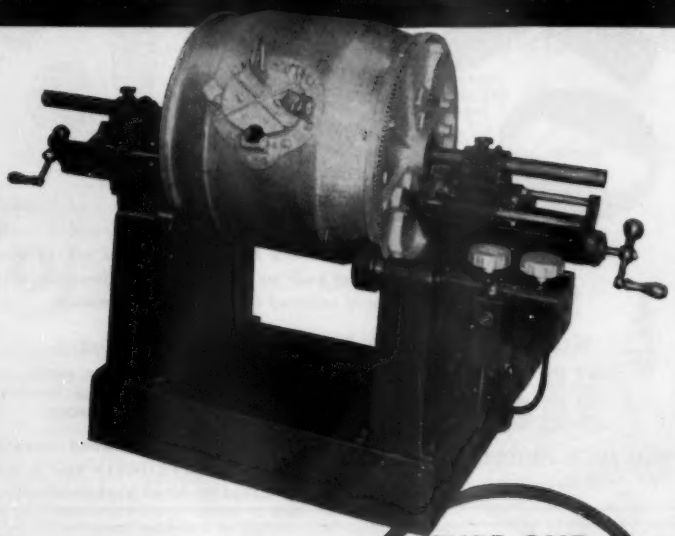
For more information circle No. 33 on the Reader Service Card

# For Research and Small Production

## DETROIT GM SERIES ROCKING ELECTRIC FURNACES



**NOW AVAILABLE IN TWO MODEL SIZES**

**TYPE GMT**
CAPACITY—100 lbs.
POWER—50 KW

**TYPE GMS**
CAPACITY—60 lbs.
POWER—30 KW

With these Detroit Rocking Electric Furnaces, you can melt small quantities of any ferrous or non-ferrous alloy to the required analysis quickly, economically. Indirect arc melting provides accurate heat control plus minimum carbon pickup. Automatic rocking action assures homogeneous alloying, full heat utilization and longer lining life. Electrodes are independently mounted for easy shell interchange. Types GMS and GMT Furnaces are sold complete with transformers, ready for installation. Write today for full information.

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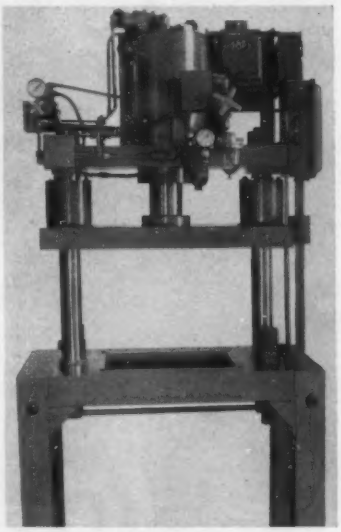
1070 26th St. • BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3. Mexico 6, D. F., Mexico: EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

*For more information circle No. 42 on the Reader Service Card*


### *HYDRAULIC TRIM PRESS . . . has many new features*



A new, high speed, twenty ton hydraulic trim press that has been designed specifically for flash removal on die castings and plastic parts has been introduced by Buffalo Metal Container Corp.

The press is powered by a three horsepower motor. It uses the parallel strain rod principle with a moving platen and heavy duty guide bearings that give a large, well suppported working area which permits off center loading and great versatility of tooling.

All operating components are mounted on top of the press so that the entire area under and around it are free of equipment. This open design permits the use of chutes, conveyors and other means of mechanically handling both the scrap and the trimmed parts.

The press has a fast approach — 1200 inches per minute — and a return speed of 450 inches per minute. The working stroke is, of course, much slower than either the approach or return.

Circle No. 247 on Reader Service Card

### *POTENTIOMETER, MILLIVOLT SOURCE . . . in one instrument*

A light-weight potentiometer and millivolt source have been combined into one instrument.

Designed for both laboratory and field use, the Model P-55 measures 4⅛ x 4½ x 7½ inches and weighs 3½ pounds. It can be used with any thermocouple or to measure any potential in the 0-55 mv range. It will also

supply the same millivolt potential for check-out of recorders and other instruments.

A dual input provides two sets of 55-way binding posts for convenience in checking two thermocouples or one thermocouple mounted against a standard. A thermometer is shock-mounted in the lid, and the instrument is available in a weather-proof aluminum or mahogany case.

**Allegany Instrument Co., Inc.**
**Circle No. 262 on Reader Service Card**

## MORTON MADE MANAGER OF MICHIGAN PLANT

George Morton

George Morton, president of Ferro Cast Corp., Santa Monica, California, has been appointed general manager of Pressed Metals of America, Inc., Port Huron, Michigan.

Announced by Frederick W. Richmond, Chairman of the Board of Pressed Metals, the appointment followed a decision of the company to resume production operations.

Sales efforts, tooling, and production plans of Pressed Metals will be aimed at the 1958 model automobile.

## TO MAKE DIE CASTINGS

M. J. Markowski has resumed full time activity with the Mark-Shaw Corporation, 18206 Windward Rd., Cleveland, Ohio, drawing on his years of experience in the die casting field to direct formation of a new company which is slated to produce castings.

The firm will be able to supply die castings by mid-summer.

## ROCHESTER PRODUCTS UPS JOHN B. BURNELL

Appointment of John B. Burnell to the newly-created position of assistant chief engineer in charge of advanced design for the Rochester Products Division of General Motors was announced today by Wallace E. Wilson, general manager.

In his new position, he will be responsible for engineering design and development work on new products and for advanced engineering on current products being manufactured by the division in Rochester, New York. The firm now makes carburetors, fuel injection systems, lock and key assemblies, and other items.

## LETTERS

*continued from page 30*

### HI-GLEAM CASTINGS

Will you kindly advise us if you know of a process called Hi-Gleam which is specially designed for zinc die castings. A. I. purchasing agent.

*We have never heard this term applied to die castings. Perhaps some of our readers know about it and will tell us. ed.*

### EQUIPMENT SOURCE

Your article on Electrostatic Paint Spraying and Plating by Willard G. Axtell, Swayder Bros., Inc., April, 1957 issue.

We should be very pleased to receive the exact address of the firm who can supply the respective installation. Schmidt & Co. (Germany)

*The names and addresses of firms who can supply this equipment have been sent. Ed.*

### TITANIUM POWDER METALLURGY

I have been working as Plant Metallurgist and am a regular reader of PMM. Articles published on Titanium Powder Metallurgy in the May, June and July, 1956 issues are most informative. I wonder if you have any reprints on I, II, and III. If you would send them to me for my permanent file, I would be most appreciative.—N.K. (Plant Metallurgist)

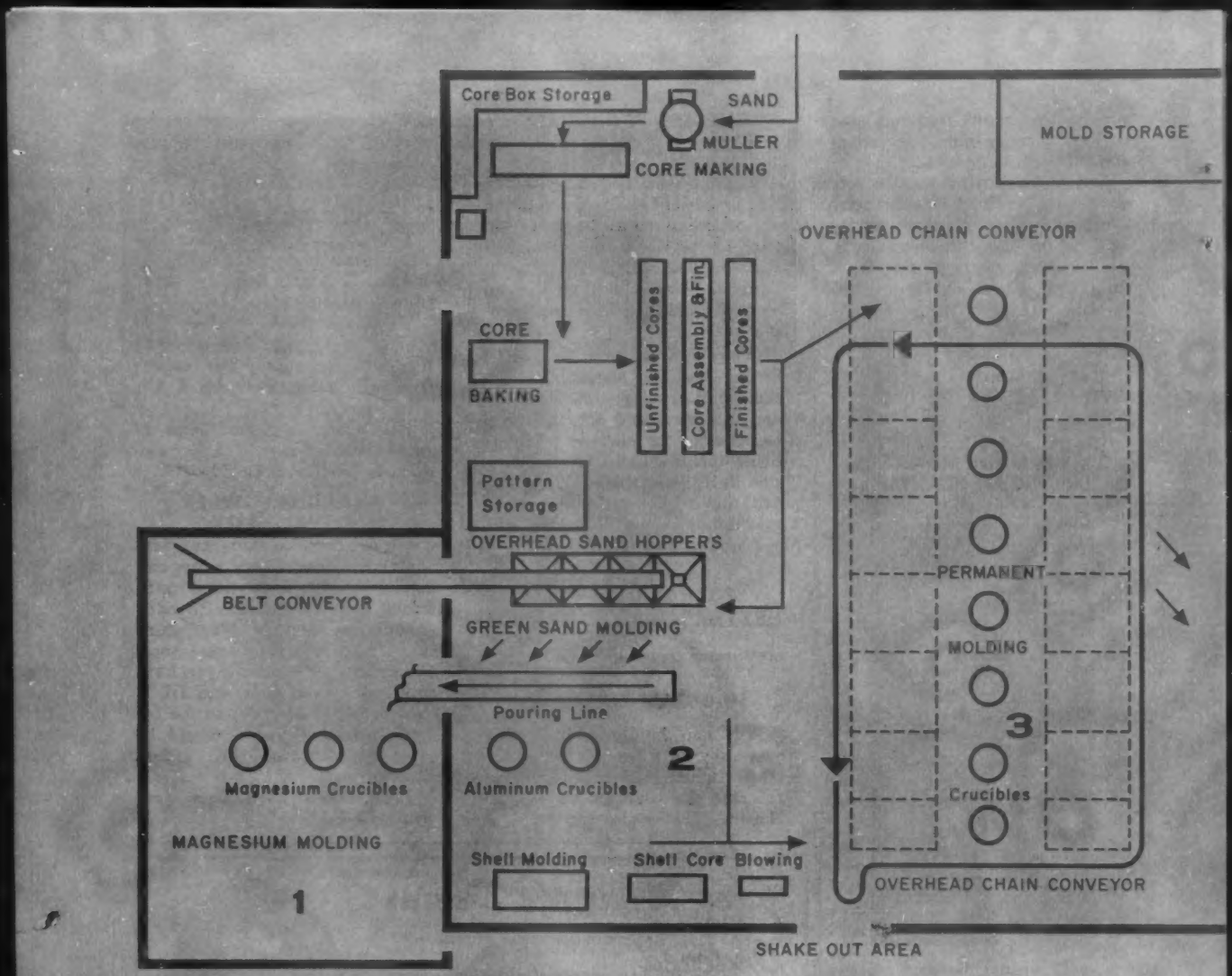
*Tear sheets have been forwarded.—Ed.*


*Just What the Doctor Ordered*

ALUMINUM
ALLOY
DIE CASTINGS
by
STROH

We have the prescription for faster service, finer product and greater satisfaction. For more than half a century STROH has been turning out zinc die castings which are unsurpassed in uniformity, strength and function. Now we offer full facilities for
ALUMINUM DIE CASTINGS
which are of equal superiority.
*INQUIRIES INVITED!*

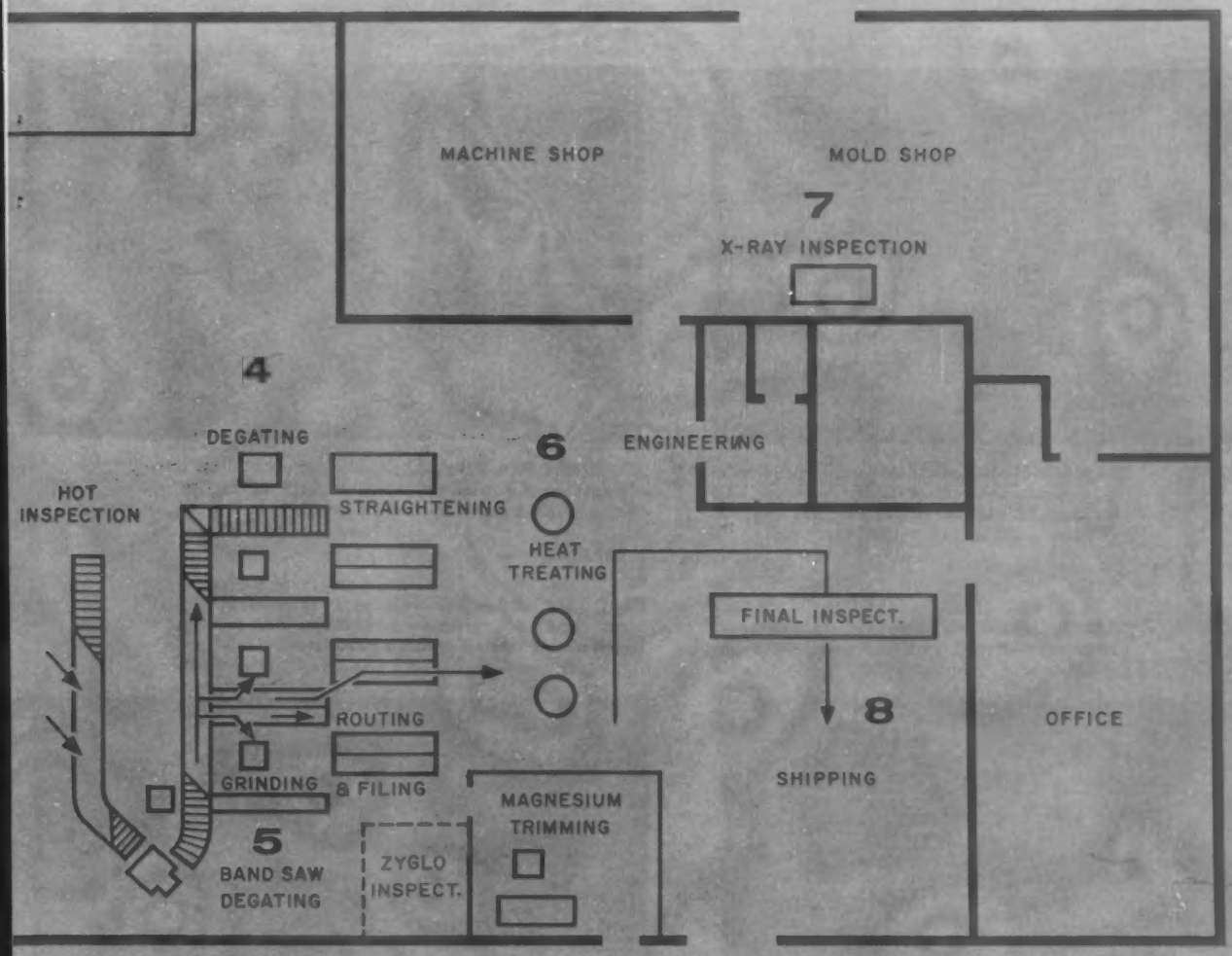
STROH DIE CASTING CO. INC.
11123 W. Burleigh St., Milwaukee 10, Wisconsin



**By Scholar Bangs**
Western Editor

**This foundry increased its production potential 133 percent: All it took was imagination plus . . .**

# Hook-Line And Rollers




ELLIO DALMAU, young Peruvian graduate of University of Michigan, had three strikes against him when, as plant engineer, he laid before Frank Gaines, owner of Gaines Company, floor plans for a new foundry to be built at Rivera, California.

What he proposed would look like an automobile assembly line, with a hook-line overhead conveyor looping over 5000 of the plant's 30,000 sq. ft. of floor area, and gravity roller conveyors extending, finger-like, from one production zone into the next.

"I didn't want that overhead conveyor, or even the roller conveyors. The whole scheme seemed impractical for a light-metals plant operating on short-run jobs. It was contrary to all approved practices of materials handling in foundries," Gaines recalls.

Today he is glad he gave his plant engineer a 'green light' go-ahead—with an "It's your neck!" attached.

The mechanized conveyor systems, serving 13 aluminum and magnesium crucibles, core shakeout, hot-inspection, bandsaw de-gating, grinding and straightening, cost $20,000, and already have been amortized (since the opening of the Rivera plant in August 1956) by savings of manpower, conventional forklift handling equipment, storage bins and floor area.

Based upon results of nine months' initial operation, Gaines Company estimates the plant's production potential to be $350,000/mo., using a single 8-hr. shift of 72 production workers and a clerical and administrative staff of 20.

The company estimates that single-shift production capacity would be only $150,000/mo. had the plant been laid out for standard forklift materials handling. And, an additional 7500 sq. ft. of floor space would have been required for bin storage now absorbed by fluid in-process storage on the 250-hook overhead conveyor and on roller conveyors.

To maintain the latter, conventional operation would have required the purchase of a second $4500 forklift (the plant now uses one forklift for intermittent assignments, its driver assigned to other plant work when it is inactive), and additional storage containers costing $1000. Two full-time forklift drivers

**1** **MAGNESIUM** is melted and poured in a separate area, easily fed by a pouring line adaptable to permanent molds, shell or green sand molds.

**2** **SHELL MOLDS** and shell cores are produced in the same general area as green sand molds. Only a single bank of furnace is required.

**5** **EARLY INSPECTION** shows up any faults in casting. Correction at this point saves machining and finishing dollars.

**6** **HEAT TREATING** when required is in pit type furnaces. Always prior to machining. This relieves casting strains so that distortion after machining is avoided.

and two storage stackers would have had to be employed at a base salary cost of $4800/yr. each, or $19,200/yr. for the four employees.

The foregoing economic comparison of this company's mechanized materials handling and conventional handling techniques represents only a portion of benefits realized through mechanization.

Astonishingly fast production flow has been realized, and two to three days have been slashed from the pour-to-door time which would have been required without mechanization.

Depending solely upon forklift and manual handling, castings of one day's production would have had to be gathered in containers and held in a storage area for delivery the following day to finishing departments. Manual re-gathering of castings and re-distribution through consecutive finishing stages, and inspection from container storage would have imposed further penalties against flow time. Also, throughout the plant, from pouring areas to the shipping zone, production workers would have been inactive during the not inconsiderable periods when forklift movers invaded their work areas.

Production control, a serious problem before Gaines Company moved into its mechanized plant, presents no headaches to the foundry's supervisors, even though molds may be active on more than a score of separate items and containers are constantly filled with from 6000 to 10,000 castings. Due to the fact that finishing operations work so closely behind the molders, supervisors easily follow the work as it progresses toward the shipping door. No containers are shunted into storage, where they could become mixed and require a time-consuming search for parts required to complete a given order.

Assisted by the hook-line conveyor and knee-level roller conveyors, finishers work only two hours instead of a full day, behind the molders.

Similarly, mechanization has brought with it a high development of quality control. Under the conventional system of materials handling inspectors were at least a day behind the molding operation in examina-

**3** **PERMANENT MOLD CASTINGS,** that make up the bulk of the output, are on a continuous pouring line served by a hook-line conveyor the casting transport.

**4** **DEGATING** is done on a band saw, often while the castings are still hot. Snagging and rough sanding complete the first trimming operation.

**7** **X-RAY INSPECTION** can cause a production bottle-neck. It is only done when customer specifications demand it.

**8** **FINAL INSPECTION** may be on 100% of the castings or only on sufficient for quality control standards. End use and customer specifications are determining factors.

tion of work entering the finishing zones. Often this would be their first opportunity to spot, after a full day's production, the results of a bad mold In the Gaines plant, however, every item, still hot from the molds, is subjected to a visual inspection as it is removed from the hook line and placed in containers on the roller line leading to the first finishing operation—bandsaw de-gating.

This early every-unit inspection has been responsible to a large degree for a relatively low reject rate. Gaines Company records show that production workers easily meet a 5 percent total scrap allowance per quarter per man. The reject rate on finished work is less than 5 percent.

Also materially helpful in maintaining good quality control is the fact that the Gaines plant is a "clean" foundry. Aisles are kept clear, and work areas are unencumbered by piles of castings waiting for the fork-lift—they all go onto the hook line or into roller conveyor containers as rapidly as they come from the molds. Unusually good working conditions have enabled the plant to demand, and attract, skilled production workers, some of whom under an incentive plan are able to increase their earnings from wage guarantees ($2.25-$2.50/hr.) to $5 and $6 an hour.

Inasmuch as 80 percent of this plant's production capacity is keyed to permanent mold operations, it may be said that the hook-line conveyor is the "heart" of the mechanization venture. It is a relatively light-load line, suited to handling small dimension castings which comprise the bulk of the firm's orders, received mostly from aircraft manufacturers throughout the nation. Each of its hooks has a 60 lb. load capacity. Encircling the pouring area served by eight Lindberg Fisher gas furnaces, it tours its 280 ft. circuit at a speed of 30 ft./minute, which can be speeded to from 45 to 60 ft./min. to meet a surge in work load.

At every point on the pouring line, workers manning the molds are one step removed from the passing conveyor hooks.

The foundry's owner admits that when the hook-line first was put into operation considerable trouble

*See the difference*

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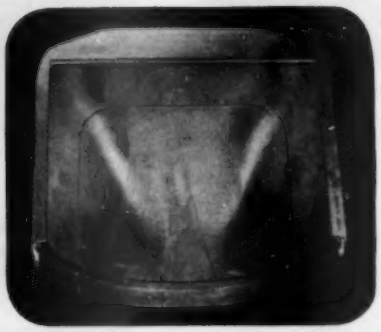
## *makes*... in aluminum permanent mold castings

WITHOUT Foseco DYCASTAL



MADE WITH Foseco DYCASTAL

Foseco DYCASTAL is a scientifically prepared "boiling flux" for eliminating tears, shrinkage and cracks in aluminum permanent mold castings . . . and will limit and carefully control gassing of aluminum alloy melts.

**ADVANTAGES OF Foseco DYCASTAL—**

- *produces sounder castings*
- *savings made by eliminating expensive die alterations and loss of time*
- *cleaner metal because the bubbling action brings dirt and other non-metallic inclusions to the surface*
- *increased fluidity because the impurities can be skimmed off with the dross*
- *economical and easy to use*

**Take advantage of Foseco DYCASTAL and produce *better* aluminum castings in your foundry.**

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Clip and mail this coupon today for a copy of the DYCASTAL leaflet giving complete information on this product and its use.

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was experienced in persuading workers to use the 'new-fangled contraption'. He relates:

"They had been in the habit of throwing completed castings on the floor, and they protested that taking one step from mold to hook-line was wasting their time. I had to go onto the floor at least three times a day to get them started to using it. But, they finally got the idea. They were able to see that they were losing more production time in stopping to load their finished castings into containers, and waiting for the forklift to remove them from their working areas, than in taking the one-step-per-casting to reach the conveyor.

Considering that the system has enabled the plant to move work from casting through finishing to heat treat in 24 hrs., and average five days per job from casting to customer delivery, it is understandable that strong interest should be shown in further mechanization.

Currently, the company's plant engineer, Dalmau, who proposed the conveyor systems, is assigned to refinement of the use of shell mold and shell core machines to supplement permanent mold operations.

Frank Gaines declares that a growing problem is that of obtaining skilled sand cast moulders who are able to meet the tolerances required by the aircraft industry. "The answer appears to be in the shell mold machine which, once it is set up, can be operated by a molder whose skill need not exceed his ability to press a button and carefully time, from a clock in front of him, periods of operating sequence," he said.

It is estimated that, when operational "bugs" are eliminated the firm's two shell core machines will be able to handle 30 percent of the plant's manual core-making capacity, and that the shell mold machine will handle production which otherwise would require employment of four additional skilled molders.

It has been necessary to include in the plant a fully-equipped machine shop to service contracts stipulating machine-finished castings and welded casting assemblies. It also has been necessary to maintain Zyglo and X-Ray inspection departments.

Against a "normal" 5-days delivery time achieved on routine aluminum alloy orders, those involving machining and extensive X-Ray inspection may require a

flow time of up to seven days in reaching the delivery door, X-Ray work being the primary delaying factor.

Is mechanization of materials handling, as practiced by Gaines Company, in the use of conveyor systems a technique that can be applied to all foundries to achieve increased production capacity, better production control and gains in quality control?

Unfortunately the answer cannot be wholly affirmative.

Frank Gaines believes that his own experience has proved that it is applicable to either short or long-run operations, but he says that the plant must be one engaged in volume production.

He believes that to be fully effective it should not be attempted by a foundry operating less than four furnaces and employing fewer than 25 production workers.

---

### AS&R BUYS ENTHONE

American Smelting and Refining Company has acquired all of the outstanding stock of Enthone, Inc., New Haven, Connecticut, in exchange for shares of common stock of ASARCO. Enthone manufacturers metal finishing specialties and equipment.

An announcement made by K. C. Brownell, Chairman of the Board and Chief Executive Officer of American Smelting, stated that Enthone will be operated as a subsidiary of ASARCO.

The acquisition of Enthone will add impetus to ASARCO research efforts in the continued development of new products and processes to meet the rapidly changing requirements of the metal finishing industry. Enthone, founded in 1938 by Dr. Walter R. Meyer and J. F. Buckman, occupies a respected position in the metal finishing industry.

Sales and distrubution policies will be coordinated as quickly as possible without jeopardizing the interests of the distributors now handling the two lines of products, according to Mr. Brownell. Dr. Meyer will continue as President of Enthone. M. R. Herman of ASARCO will replace Mr. Buckman, Vice President, who is retiring. C. C. Helmle, Enthone Sales Manager, and Sherman M. Goble, Manager of Federated Electrochemical Department, will coordinate the sales efforts.


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▶ permanent mold castings
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## FUTURE PROGRAM OUTLINED BY PMPMA ASSOCIATION DIRECTORS

From left: Smith Bolton, G. G. Fellows, G. L. Bachner, PMPA president Gleszer, W. R. Toeplitz, M. T. Victor, and G. W. Trichel. Directors not seen in the above picture are: J. F. Helsel, and J. E. Miller. The group met in Pittsburgh recently.


DIE CASTERS . . . *Here's Added Savings!*

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IN D-M-E No. 1 STEEL

$14^{7}/_{8}$" x $23^{3}/_{4}$"
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$23^{3}/_{4}$" x $35^{1}/_{2}$"

STANDARD PLATE THICKNESSES FROM $^{7}/_{8}$" to $5^{7}/_{8}$"

**ALL PLATES GROUND FLAT and SQUARE**
Ready for your die layout and cavity inserts

**Precision Ground LEADER PINS and BUSHINGS**
For accurate alignment and longer wear

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CLEVELAND 9, O. - D-M-E CORP. 502 BROOKPARK RD., SHADYSIDE 1-9202
LOS ANGELES 7, CAL. 3700 SOUTH MAIN STREET, ADAMS 3-8214

*For more information circle No. 90 on the Reader Service Card*


A broad program of industry-sponsored technical studies, statistics, and educational plans was outlined by directors of the newly formed Powder Metallurgy Manufacturers Association at the Board of Directors Meeting in Pittsburgh recently.

K. M. Gleszer, president of PMPMA said, "This is the beginning of an industry program to promote the use and sale of powder metal bearings and other parts. We are convinced that a program to develop improved technical standards, gather industry statistics, and disseminate design information will not only be valuable to our own industry but to those we serve."

Hanson and Shea, Inc., of Pittsburgh, Penn., has been retained as trade association management by PMPMA. The association represents over three-fourths of the manufacturers of powder metal precision parts.

Gleszer announced appointment of the following committee chairman: Jesse Helsel, membership; W. R. Toeplitz, technical; M. T. Victor, statistics; and Smith Bolton, budget.

Officers of the PMPMA include: W. R. Toeplitz, vice president; and George L. Bachner, secretary-treasurer.

Other directors of the association include: Smith Bolton, G.W. Trichel, Jesse Helsel, John E. Miller, G. G. Fellows, and M. T. Victor.

Powder metal parts can be produced with a wide variety of characteristics. These include such things as electrical conductivity, the usual magnetic properties, and the unique quality of self-lubrication. In addition to these advantages, the process permits manufacturing parts to precise tolerances, nearly eliminating scrap and waste.

# NOW...

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## Skimmers and Ladles available in STAINLESS STEEL and MILD STEEL

In answer to continued requests from hundreds of its ladle customers, Spincraft has added a line of truly superior skimmers. Designed after extensive research, Spincraft Skimmers meet die casters' skimming requirements. The shallow radius "skims" instead of "ladles" as deep-cupped skimmers do. Correct size perforations prevent clogging. Handle stub fits common pipe—attach a handle of exactly the type and length you want. Diameters: 6", 8", 10" and 12".

## SPINCRAFT LADLES

### for non-ferrous metal pouring

Light, tough, long-lasting — designed to reduce operator fatigue, minimize spillage and improve heat transfer. In 23 sizes, from ¼ lb. to 30 lbs.—with or without handles. A die-casting *must*.

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*Circle No. 67 on the Reader Service Card*


## MODERNIZATION

*continued from page 41*

tain and which to discard was difficult. Several of the many models being manufactured were developed to meet certain conditions. After a complete study of the models, their uses, and customer appeal, it was discovered that these "certain conditions" seldom occurred. Further analysis showed that there were only a few basic models the customers actually wanted.

This data was used as the basis of a design study and later became the foundation of the model consolidation and revision program. The firms officials admit that some things added to the cost of production. For example the switch from malleable iron, a cheaper metal, to aluminum which was more expensive. A new part was designed and made. Much of their sales literature became obsolete. But as fast as a part could be eliminated or redesigned so as to be produced by the permanent mold process, the change was made. The theory behind this is

*Continued on page 99*


*Circle No. 57 on the Reader Service Card*

## FOR DIE-CASTERS

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P-W AIR-LUBE SYSTEM

*Patent Applied For*

• VAPOR IS ADJUSTABLE
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Speeds production and eliminates many causes of down-time through effective cleaning and *adjustable* thin-film lubrication of all mold-cavity surfaces.

PROVED IN USE BY PROMINENT DIE-CASTERS

S-W-I-S-H! One pressure whisks mold clean with powerful air jet. S-W-I-S-H! Further pressure on same lever shuts off air and lubricates.

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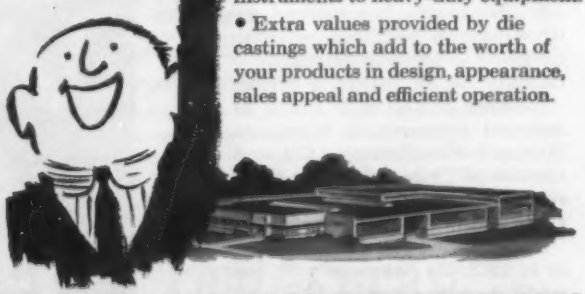
## DIE CASTINGS by MILWAUKEE

• Extra values provided by the modern Milwaukee plant with every facility for Complete Die Casting Service.

• Extra values provided by more than 45 years of continuous service to industry in producing precision die cast parts for all types of assemblies from small intricate instruments to heavy-duty equipment.

• Extra values provided by die castings which add to the worth of your products in design, appearance, sales appeal and efficient operation.



Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

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Established 1909

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# NEWS OF INDUSTRY & ASSOCIATIONS

*activities of people, companies & groups in the precision metal molding industries*

## MADISON-KIPP WINS AWARD FOR MILLION MAN-HOURS MINUS DISABLING INJURY SINCE SEPT. 17, 1955

Madison-Kipp corporation, manufacturer of die casting products, received an award recently for its record of one million man-hours' operation without a disabling injury. The award was made by American Motorists Insurance Company, a division of the Kemper Insurance group. Madison-Kipp vice-president Austin T. Lillegren accepted the award from Leslie N. Christensen, president of Lumbermens and Manufacturers Mutuals of Wisconsin, which represents the Kemper group companies in Wisconsin. The company's more than 300 employees began their accident-free safety record on September 17, 1955. Although the record has been continued, the award covers a 19-month period through April 10, 1957.

Austin T. Lillegren, vice president of the Madison-Kipp Corp., is seen above, at right, accepting the million man-hour award from L. N. Christensen.

## MINNESOTA MINING ELECTS FOUR NEW OFFICERS

Election of Robert H. Tucker as secretary of Minnesota Mining & Manufacturing Co., and Irwin R. Hansen as treasurer of the company, was announced recently.

Tucker succeeds John L. Connolly, who has reached retirement age. Connolly, also general counsel for 3M, has been asked to continue in that capacity for an indefinite period. He will also continue as a director.

Hansen succeeds Clarence M. King, who had been treasurer and assistant secretary of 3M since 1950. King, who has reached retirement age, has been asked to continue to serve in an advisory capacity for an indefinite period.

Election of Kelvin T. Bacon as assistant treasurer of Minnesota Mining & Manufacturing Co., and election of Thomas J. Lyons as assistant secretary of 3M, was also announced.

Bacon joined 3M as a bookkeeper in 1928. He has been with the credit department since 1930, and has been general credit manager since 1954.

Lyons has been an attorney with the 3M law department since 1951.

## ALCOA NAMES DR. DEAN ASSISTANT METALLURGIST

Dr. Walter A. Dean, a recognized industry authority on light metals alloy and process developments, has been named assistant development metallurgist for Aluminum Company of America, the company announced today.

The promotion moves Dr. Dean from his position as chief metallurgist for Alcoa's Cleveland works to company headquarters in Pittsburgh. Thomas R. Gauthier succeeds Dr. Dean at Cleveland.

Dr. W. A. Dean

## E. F. HOUGHTON EXPANDS

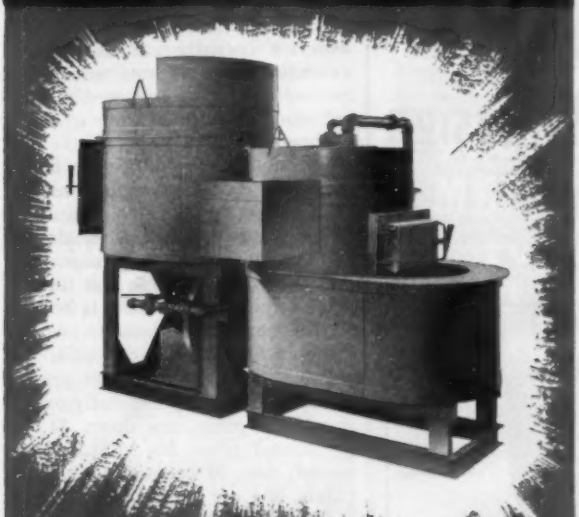
E. F. Houghton & Co., oil, chemical and packing manufacturers, Philadelphia, announces new expansion of its manufacturing facilities in Detroit, more than doubling the plant size.

Plans have been drawn and bids are being obtained for new factory, office and laboratory space adjoining the present location at Lumpkin Ave. and Detroit Terminal R.R.

The company plans to manufacture in Detroit practically the same oil and chemical specialty line now being made in the Chicago, Philadelphia and San Francisco plants. This will include lubricants, rust preventives, forging agents, cutting fluids, drawing compounds and fire resistant hydraulic fluids. Solvent type blends and additive treated oils will be supplied from the new plant, in addition to heat treating salts, carburizers and quenching oil.

Ground was broken in June and the plant is expected to be ready for manufacturing before the end of 1957. Between the old and the new plant, a fully equipped laboratory will be provided for control and customer service.

# HERE'S ANOTHER NEW ONE!



**Stroman "DC" Cylinder Type Furnaces for Combination Melting and Holding Aluminum with CONTAINED COMBUSTION BURNERS**

For Die Casting, Permanent Mold and Sand Casting Operations

"Versatility Plus" is the keynote of these newest Stroman Contained Combustion Furnaces. They are absolutely new in design for they incorporate Contained Combustion Burners which eliminate direct flame impingement on the metal. They also make for cooler working conditions because of less heat loss. They give greater fuel economy for less BTU input is required . . . Longest refractory life and least maintenance due to mild combustion conditions . . . Uniform heating condition and improved metal temperature control assure lowest metal losses.

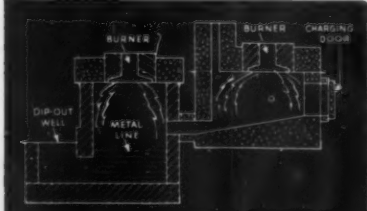
They are easy to charge and readily adaptable to automatic charging. Handling from 450 to 1600 lbs. per hour break down capacity with holding capacity from 600 to 2400 lbs., they will melt metal faster and more economically, and at the same time produce only the highest quality metal.

Roof of the furnaces are easily removed for furnace cleaning, relining, repair or burner service, as burner is mounted in the roof.

These Stroman "DC" Cylinder type furnaces are available in break down and holding combinations. However separate break down and holding units can be purchased. Break down units are often used to augment iron pot, electric and crucible furnace capacities.

Their flawless operation and ability to deliver years of trouble-free operation stamp them as a leading Stroman Aluminum production furnace. Investigate their cost cutting operation today.

*Send for complete new catalogue No. 150 just off the press.*




**STROMAN**
FURNACE & ENGINEERING CO.
FRANKLIN PARK
ILLINOIS

*For more information circle No. 68 on the Reader Service Card*



## HOW A DOUBLE CONVERTER HOUSING WAS CAST IN ONE PIECE

*By F. S. Ross, Vice-President in charge of Engineering Centr-O-Cast and Engineering Co.*

The manufacturer of industrial engines had a problem: he needed a cast aluminum housing for a double hydraulic converter. The piece would weigh 70 lbs., and was highly complicated, involving cast-in hydraulic lines, a cast-in hydraulic sump, and numerous apertures, all of which had to be held to close finishing tolerances. Actually, the housing called for three castings, but to justify the design of the part, cost-wise, it seemed essential that it be cast all in one piece . . . and that was the problem.

Different casting methods were tried. Sand casting was attempted first, because it is usually economical. In this case, however, it was not, and the castings were poor. Permanent mold would give the required accuracy, but the intricate internal areas of the part presented a problem. The process that *did* work involved both of the two other techniques: semi-permanent mold. The exterior and the sump section of the part were formed in a permanent mold, while the top and half of the inside were formed in dry sand.

The permanent portion of the mold for this casting is a unique assembly. Rather than being a single mold, it consists of five separate outside shoes forming the exterior of the part, and these shoes move back and forth on five individual axes, making the total assembly similar to the petals on a flower. All are hydraulically operated, allowing us to cycle the mold properly.

We used a heavy riser for the casting, through a heavy dry sand core, with three separate pouring sprues on the flanges of the sump. By using a cover core, we were able to feed the heavy hydraulic oil-tight passages and still preserve the good dimensional accuracy of the permanent mold casting. The lower parts of the casting were very thick but quite sound, and the apertures and flanges were highly accurate. On all faces, only a minimum of stock remained to be machined. Because the casting when in use must withstand terrific strain, we had been concerned with getting sufficient wall thickness, but the finished piece proved that the original design for a ⅜" wall was more than adequate.

By casting this housing in semi-permanent mold, we succeeded in retaining the advantages of both permanent mold and sand casting. The finishing tolerances were very close, the structure was sound throughout, and the cost figure was excellent.

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**AND ENGINEERING COMPANY**
45 St. Jean Avenue • Detroit, Michigan

55

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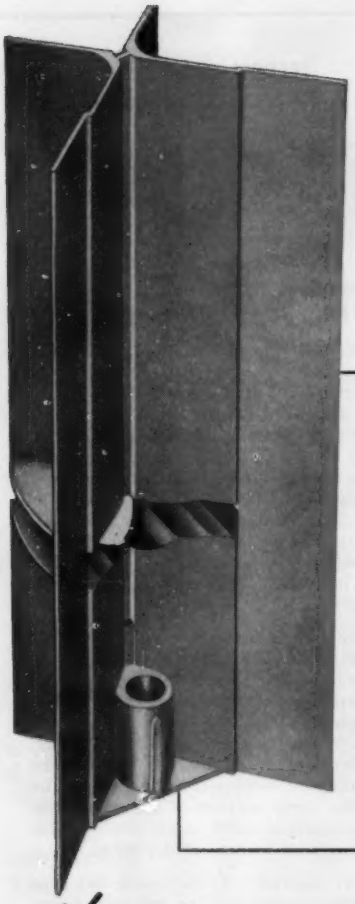
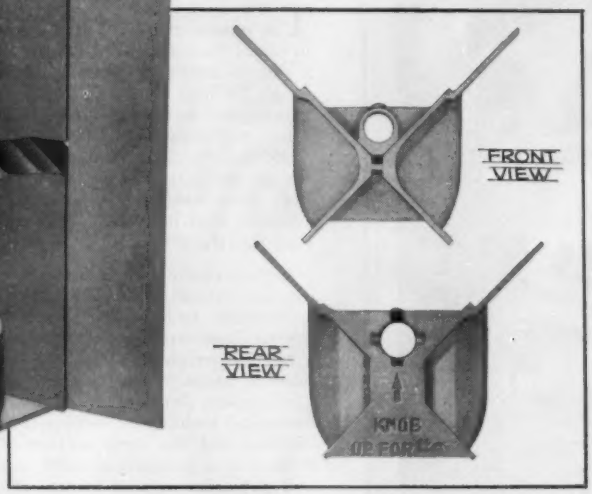


# Die casting made this design possible




*Here's a switch!*

Product design usually dictates which production process will best produce the part. This is a case in reverse . . . where the process influenced the design.

Most important, this customer knew production. He knew that only die casting could hold the tolerances, maintain the uniformity, meet the unit cost requirements, and still produce at the necessary speed.

What did he do? He brought his partly completed design to Twin City Die Castings Company. When Twin City cleared the part for die casting, the customer completed the design.

Then Twin City went beyond. Expected costs were slashed when Twin City used hinged cores.

The customer saved money because he knew production requirements and allowed die casting to do the maximum job for him. Twin City Die Castings knew how to make the process perform for the customer.

Twin City's ability to make die casting help solve design problems has proved a service extra for hundreds of customers. When you design for die casting write, wire or phone Twin City Die Castings Company. Chances are, a Twin City engineer can make die casting solve design problems for you.

**...only DIE CASTING can**

**✔ cut your costs ✔ offer such flexibility**

**✔ provide such accuracy**

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**TWIN CITY DIE CASTINGS CO.**

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## TITANIUM METALS SAYS PRICES REDUCED 10% ON BARS, BILLETS, ETC.

Titanium Metals Corporation of America recently announced an average 10 percent price reduction in titanium bar, billet, wire, plate, extrusions, and non-alloy grades of sheet and strip.

Technological advances in consumable-electrode vacuum melting, scrap recycling, continuous rolling and vacuum annealing, coupled with sustained capacity operations, have made the latest price reductions possible. It is the sixth general mark-down in prices initiated by TMCA since 1954.

Price declines vary from product to product. Commercially-pure sheet and strip are down $1.50 per pound; plate, 50¢ to $1.25 per pound; bar, 95 cents per pound; billets, 85¢ per pound; and wire, $1.00 per pound. Extrusions have declined about 12 percent, or approximately $1.90 per pound. Titanium powder is reduced from $10 to an average $8 per pound.

## TWO MILLION VOLT X-RAY BOUGHT BY LEBANON F'DRY

Lebanon Steel foundry has recently purchased a 2,000,000-volt X-ray machine for radiographic inspection of steel castings, it was announced by W. H. Worrilow, president of the firm.

The new machine brings Lebanon's X-ray equipment to three units, including a 1,000,000-volt X-ray machine and a 220,000-volt X-ray machine. The enlarged capacity and facilities will permit X-ray inspection of metal section thicknesses from 1/4 in. to 12 in.

The 2,000,000-volt unit is being operated in Philadelphia, and its excess capacity will be available to metal working plants, fabricators, and testing laboratories in the greater Philadelphia area.

## THE ARWOOD COMPANY EXPANDS WEST COAST OPERATION

Arwood Precision Casting Corp. is expanding its West Coast operations to meet the increasing requirements of the Aircraft, Rocket, and Missile companies plus general Western industrial expansion for non-ferrous castings as well as steel. Arwood has just completed negotiations for the purchase of the Duncan-Rohne Company and the Malco Metal Products Company, both of North

Hollywood, California. Duncan-Rohne is the largest producer of non-ferrous investment castings on the West Coast and Malco specializes in machinery castings. Both companies will continue to operate at the North Hollywood location as subsidiaries of Arwood Precision Casting Corp.

The company's present west coast operations include a production plant for steel investment castings, a sales organization and engineering staff. With the acquisition of a non-ferrous plant, Arwood will be able to give its customers complete consulting and production service.

The additional floor space obtained brings Arwood's total for its 6 producing plants to 150,000 sq. ft. and will increase sales from $8,500,000 to over $10 million for 1957. The 150 people in the new plants will bring total employment to 900.

## PRODUCTION MANAGER FOR LORD CHEMICAL CO.

John G. Kearns has been appointed production manager of Lord Chemical Corporation, York, Pa., manufacturer of equipment and compounds for precision barrel finishing of metals and plastics.

H. R. Stitely, president of the firm, announced that in his new position Kearns will be responsible for ordering and expediting materials to meet sales forecasts, customer orders and shop requirements of the company.

## CENTRAL ALUMINUM DEPT. NOW AT FEDERATED METALS

The Federated Metals Division of American Smelting and Refining Company has announced the establishment of a new Central Aluminum Department, effective June 1, 1957. The department will include the Company's present Detroit Plant, and a new plant now under construction at Alton, in the state of Illinois.

G. M. Baumann, former Assistant to the Vice President in charge of the Federated Metals Division, will head the new department with the title of General Manager. Mr. Baumann will make his headquarters at Alton when the plant goes into production in mid-1958.

This event is scheduled for a date which is now unset, according to company officials.


Now...Cannon-Muskegon offers

complete

VACUUM MELTING service and UltraMet alloys...

*Now available are:*

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RIGHT NOW . . . Cannon-Muskegon provides you with a ready source of super-clean, superior strength alloys to meet complex metallurgical applications. Our completely equipped and expertly staffed vacuum melting facilities as well as chemical, physical and metallurgical laboratory can help you *find, test and produce* vacuum melted alloys for any application . . . in test or production quantities . . . with accurately predictable properties.

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For full particulars write for our New Bulletin on Vacuum-Melting and Air-Melting facilities, products and service.

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## USING MORE DIE CASTINGS WILL HELP GROWTH OF EUROPEAN INDUSTRIES

The expanded use of die castings among Western European manufacturers can accelerate the growth of European industry, according to John L. Kimberley, executive vice president, American Zinc Institute.

In the healthy atmosphere of free trade, vigorous promotion by individual companies and cooperative trade organizations can bring the special advantages of die cast products to public attention and thus provide the broader market required for mass production, he said.

He spoke before the Second International Die Casting Conference.

Kimberley pointed to the increased demand for hard consumer goods in the European economy today—a demand best served in many products by die casting, he said. The development of completely free trade among Western European countries and the United Kingdom will make many industrial activities practical which could not have been considered previously, according to Kimberly. Aggressive and efficient production of die castings at a competitive price will be able to develop many future markets large enough to be best handled by die casting, he predicted.

## RICHEY V.P. FOR FINANCE AT WAGNER BROTHERS INC.

Phil H. Richey, former plant manager of the Bowling Green, Ky. facilities of Dextrex Chemical Industries Inc., has been appointed vice-president of finance for Wagner Bros. Inc., J. R. Wagner, president, announced recently.

In his new position, Richey will direct all financial and accounting operations for the Detroit manufacturer of plating equipment and supplies.

## ACHESON APPOINTS TWO AS SERVICE ENGINEERS

Acheson Colloids Company, a division of Acheson Industries, Inc., announces the appointment of Kurt R. Student and Connell J. Gallagher as service engineers.

Mr. Student will work out of Acheson's Cleveland office, and will serve the Northern Ohio territory. He replaces R. G. Hartnett who has been promoted to staff service engineer at Acheson's headquarters in Port Huron.

Mr. Gallagher has been assigned to Acheson's Pittsburgh office and will cover Western Pennsylvania and West Virginia.

## DATA IN ADS

*Continued*

speed for specialized applications, is presented in the latest catalog of Hannifin Corporation.

**79. Production Impregnation**—A complete technical brochure on production line impregnation of pressure castings has been released by Imprex Division.

**82. New Design**—Bulletin 1403 from Pangborn Corp. describes the design improvements, the company's "Hydro-Finish" equipment.

**83. Chemical Processing**—is the theme of a detailed booklet published by Turco Products, Inc. Information is given on a variety of cleaning and chemical processes for any metal.

**90. Die Cavity Sets**—A 12-page brochure from Detroit Mold Engineering Co. gives complete prices and specifications on six new standard sizes of cavity sets for die casting.


# *NOW* ESPECIALLY DESIGNED FOR ADDED SAVINGS TO DIE CASTERS!

**D-M-E STANDARD Water-Cooled SPRUE BUSHING**

- *Nitrided for Longer Wear*
- *Large Capacity Cooling Jacket*
- *Ground, Nitrided and Polished Seat*
- *Available From Stock*
- *Priced at $25.00 Each*

**D-M-E STANDARD Water-Cooled SPRUE SPREADERS**

- *Nitrided for Longer Wear*
- *Straight or Tapered Body*
- *Uniform Center Cooling for Fast Cycles*
- *High Quality Air-Hardening Steel*
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**D-M-E STANDARD TAPERED CUTTER for Sprue Spreaders**

- *Solid Carbide Cutting Edges — Rigid One-Piece Design*
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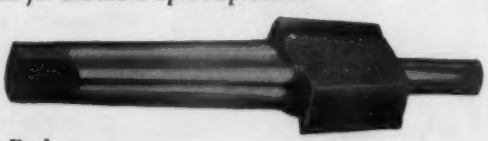

- *Priced at $28.00 Each*

Call or write TODAY . . . For Complete Specification Sheet!

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CLEVELAND 9, O.-D-M-E CORP. 502 BROOKPARK RD., SHADYSIDE 1-9202
LOS ANGELES 7, CAL. 3700 SOUTH MAIN STREET, ADAMS 3-8214

*For more information circle No. 24 on the Reader Service Card*

## PRECISION CASTPARTS CORP. COMPLETES SHELL AND INVESTMENT PLANT

Completion of a new $125,000 investment casting and shell molding plant has been announced by E. H. Cooley, General Manager of Precision Castparts Corporation in Portland, Oregon. The new plant, above, began operating June 15. Covering 21,000 square feet of floor space, the building was specially designed as an investment casting and shell molding foundry. It will also house the firm's offices.

## STUDY OF LEAD RESEARCH AIMS BEGINS FOR L.I.A.

As a part of its continuing program of providing technical assistance to the nation's industrial users of lead, the Lead Industries Association recently announced that a complete analytical study of its research aims has been authorized by the Association.

Battelle Memorial Institute of Columbus, Ohio, has been selected to conduct the study. The Association's contract with Battelle calls for a study of the "Evaluation of Research Needs and Formulation of a Research Program" for the lead industry.

Objectives of the study, as it will be conducted by Battelle, are to provide a guide for future research which will be undertaken by the Association. Research approaches will be screened and evaluated by Battelle and a balanced program will be formulated on the basis of their findings.

Special emphasis is being placed on new industrial uses for lead and its alloys and compounds. Stress will also be put on the development of new lead products.

Expected to extend over a period of six months, the results of the study will serve as a guide for the Association's steering committee when it plans co-operative research for lead industries.

Work on the project is already in progress according to the Association. If projected plans move as scheduled, final results of the study and evaluation are expected to be delivered to the Association before the end of this year.

Martin stocks standard-size cold chamber sleeves, plunger tips, and stems for *immediate* delivery to you . . . at money-saving "quantity" prices, even if you order as few as two pieces! Despite the time, motion, and bookkeeping involved in small orders, stock parts such as these actually cost you less than "special size" quantity orders of 12 or more. That's why our customers specify Martin again and again. They know that we're proud of our reputation for delivery, convenience, quality, and price. Why don't *you* specify Martin for your next job, and cash in on all these advantages?

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# OPPORTUNITIES

*jobs & equipment*

*Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding, 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.*

## POSITIONS WANTED

POSITION WANTED — Investment casting Grad. ME, 31. Wide managerial, sales, tooling and process experience, past 7 years. Energetic administrator. Proven inventive and design ability. At present General Manager medium sized foundry in Europe. Returning to U. S. early 1957. Seeks position of responsibility with ambitious, progressive organization. Actual size and location immaterial. All suggestions considered, including those from equipment or ancillary producers. Write Box No. 7257.

## POSITIONS OPEN

DIE CAST SUPERINTENDENT—Excellent opportunity for a qualified man. Assume full responsibility for all die casting operations for a multi-plant corporation. Die casting plant located in Indiana. This plant is in full operation and fully staffed. Requirements: A good executive with practical experience and a background of at least General Foreman status, and a record of accomplishment. Write Box No. 7157.

NAMEPLATE MANUFACTURER contemplates establishing a Die-Cast Department — Looking for practical, experienced man to head the department. Apply Box 7457

RESEARCH METALLURGIST: We require a young engineer with metallurgical or chemical background for research in the powder metallurgy field. The engineer selected will assist in equipping a newly constructed laboratory. Plant and laboratory are located in Central New Jersey. Applicant should submit complete resume. Salary is open. Apply Box 7557.

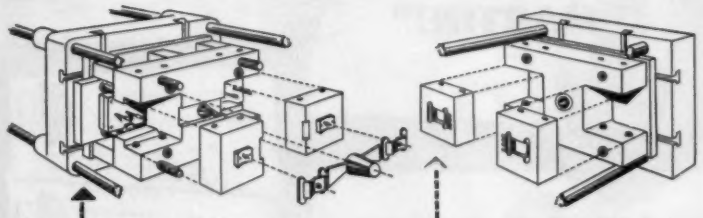
## EQUIPMENT

FOR SALE — KUX BH-30 400 Ton Die Casting Machine Convertible Zinc and Aluminum. Complete. Used Few Months. Write Box No. 7357.

FOR SALE — High Speed Hydraulic Trim Press — 20 Ton, 3 HP, 220V, 12" Dual Speed Strike, 18 x 21 Platen — Machine Parts Co. 72 Holt Street, Buffalo 6, New York.

### ESTABLISH NEW LAB.

George C. Morton, President, Ferro Cast Corporation, announces the establishment of a new sulphur and carbon analysis equipment laboratory. Ferro Cast Corporation, an Investment casting Company, feels that the addition of the laboratory will supplement their already extensive manufacturing facilities, will better improve quality and foundry control, and assure exact composition of alloys specified by their customers. The laboratory is under the direction of Mr. Joseph Charbonneau, Chief Metallurgist.

Master Mold puts an end to expensive handling of large die blocks.

Small cavity blocks can be changed in minutes and save storage space.

**MASTER MOLD SAVES UP TO 70%**

**on zinc and aluminum die casting**

Master Mold can knock a big chunk off your die costs. It eliminates expensive die sets, leader pins, sprews, sprew cutters ***plus the expense of handling such heavy equipment.*** Master Mold cavity blocks need only minutes for changing. With them, you can run two jobs together — combining short and long runs, ***doubling your machine capacity.***

***SEND TODAY FOR PROOF of Master Mold savings. Data sheets and complete cost-analysis facts, free on request, show you new die casting economy.***

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**1 - 250 KW complete with controls and spare case.**

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**2 - 60 KW complete with controls.**

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## MODERNIZATION

*continued from page 91*

that a more expensive mold produces a cheaper, more accurate casting; a more expensive aluminum alloy produces a part which costs less because reduced finishing, more resistance to corrosion, and closer tolerances are achieved.

The previously mentioned part which was added to the fixture-assembly was a newly designed component made in a permanent mold. It is the Concealing Shell seen in figure 2, and it was once used in a different form on custom-made fixtures hung in airplane hangers.

The most difficult part to transfer from a sand casting to a permanent mold-made part was the long, narrow pin seen in figure 1. This part now cast in aluminum, was once an assembly. The upper, longer stem was cast in malleable iron while the lower portion was made of aluminum. These two sand cast components were machined and assembled into the now obsolete fixtures. As it is seen in the picture, the pin is used in all four models. Getting the pin into true form and locating it for perfect balance was difficult. Thompson uses a steel pin with sand ring cores. Because of the long, narrow, steel pin core, care in casting is necessary as the part can easily cast off center.

Figure 3 shows the Pulley Housing used in all four current models. This part was included in the switch to permanent mold castings because consolidation meant it would be most used. Because of the great number of these parts needed, the housing can be mass produced at a much lower cost as a permanent mold casting.

But even more important was the fact that by using the permanent mold casting process, much more accurate sizing of the taper was possible. This eliminated several costly machining operations which included facing the flange surfaces.

The Canopy, figure 4, gives the fixture its shape, making it identifiable to the user. This part was once made as a sand casting in several different forms. It is now used on all four models.

Before the use of permanent molds, several problems plagued the foundry operations. Arranging proper gating was difficult and shrinks occurred. Since these four parts were developed, Thompson has moved into a new phase of business activity.


CASTABILITY..
Hardenability
High Conductivity..
ONLY IN
Beryllium Copper
CASTING ALLOYS

HIGHEST STRENGTH with MODERATE CONDUCTIVITY

BRUSH Alloys 250-C and 200-C can be hardened to the strength of steel (155,000 to 180,000 psi Tensile) by simple heat treatment, while maintaining 20% to 25% of the thermal and electrical conductivity of pure copper. USEFUL FOR: molds, bearings, gears, cams, valves, pumps, plungers, drawing dies, flash welder dies and other high strength and wear resistant parts.

250-C
Be . . 2.60-2.85%
Co . . 0.35-0.65%
Cu . . balance

200-C
Be . . 2.00-2.25%
Co . . 0.35-0.65%
Cu . . balance

HIGH CONDUCTIVITY with HIGH STRENGTH

BRUSH Alloys 55-C and 35-C are specified where highest thermal and electrical conductivity are required. By combining 45% to 50% of copper's conductivity with high strength (95,000 to 120,000 psi Tensile), these alloys find application in: switch and circuit breaker contacts, welding electrodes, slip rings and contact arms, and parts in which conductivity and strength at elevated temperature are vital.

35-C
Be . . 0.25-0.50%
Ni . . 1.40-1.60%
Cu . . balance

55-C
Be . . 0.55-0.75%
Co . . 2.40-2.60%
Cu . . balance

Brush Beryllium
BERYLLIUM COPPER CASTING ALLOYS
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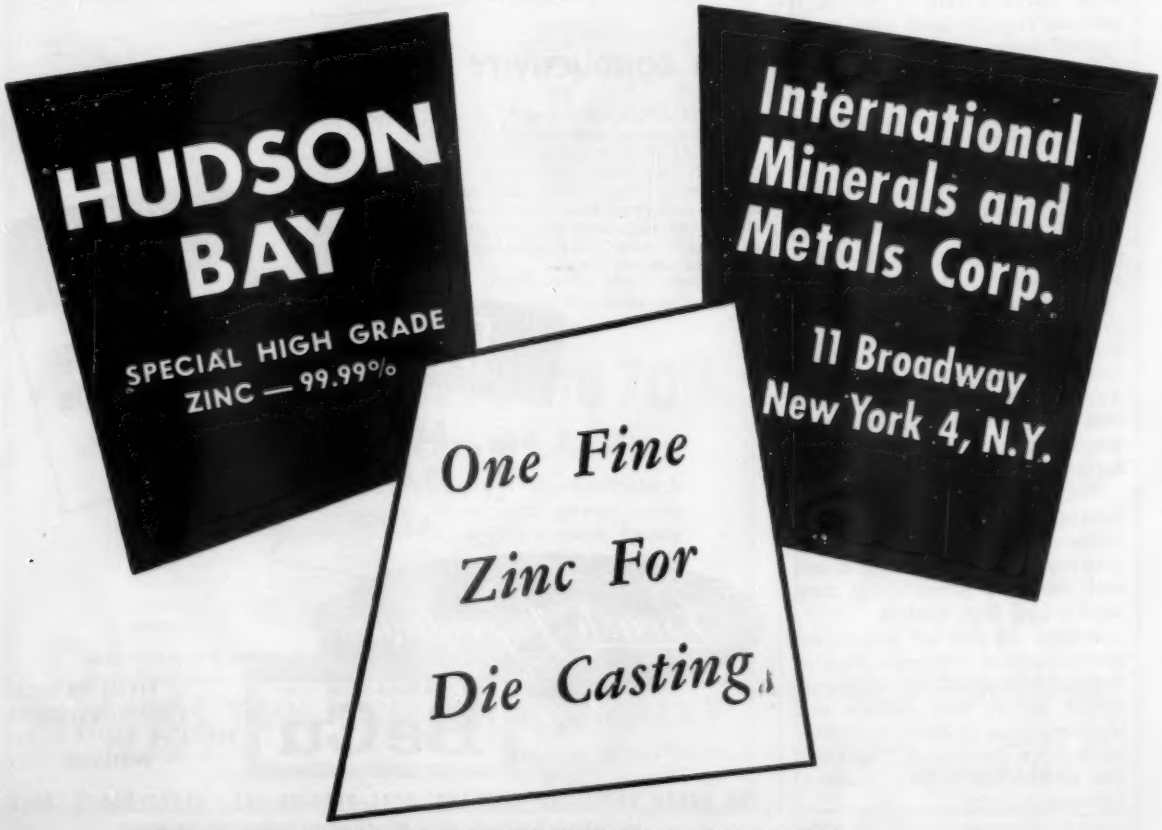
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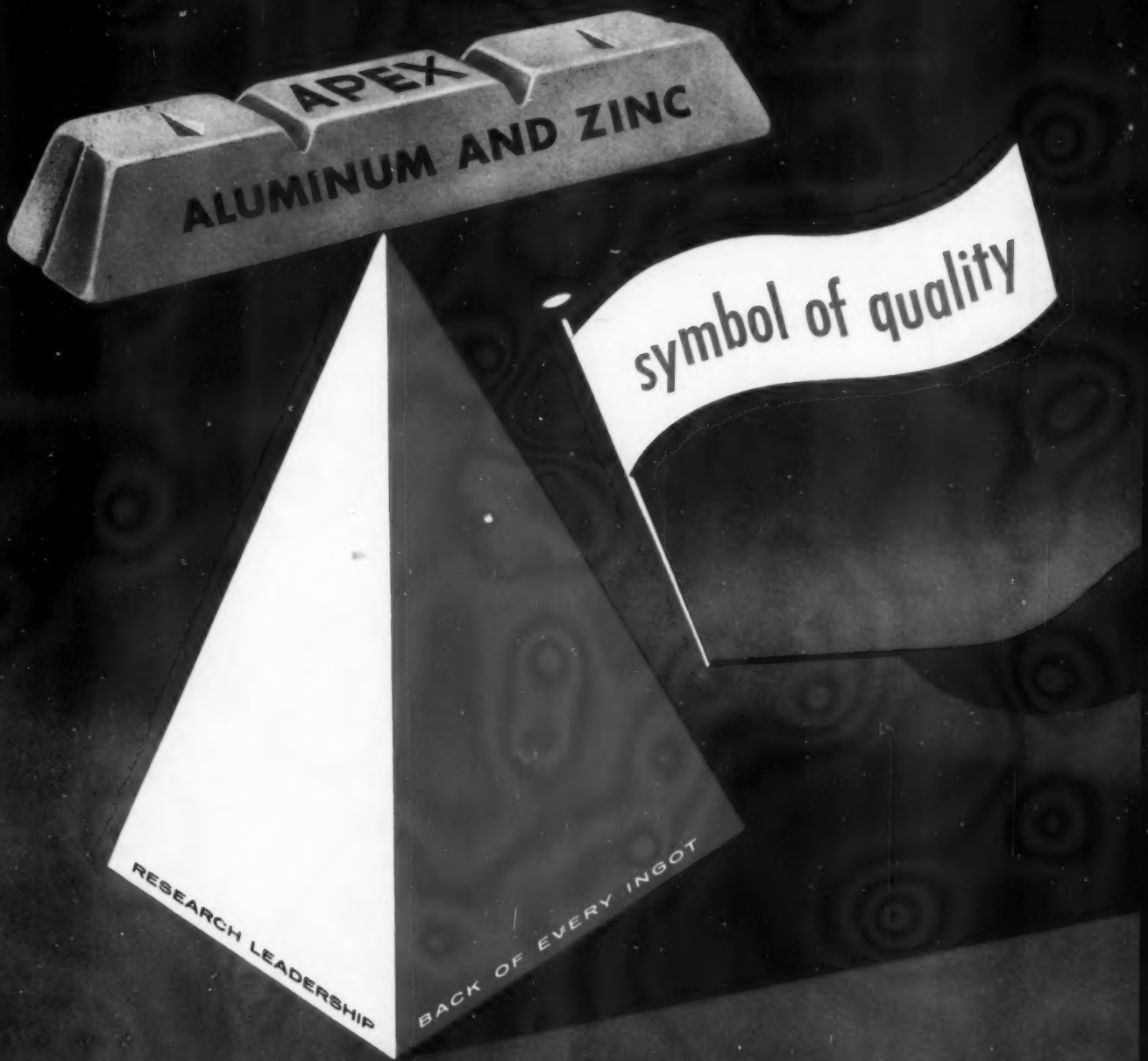


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